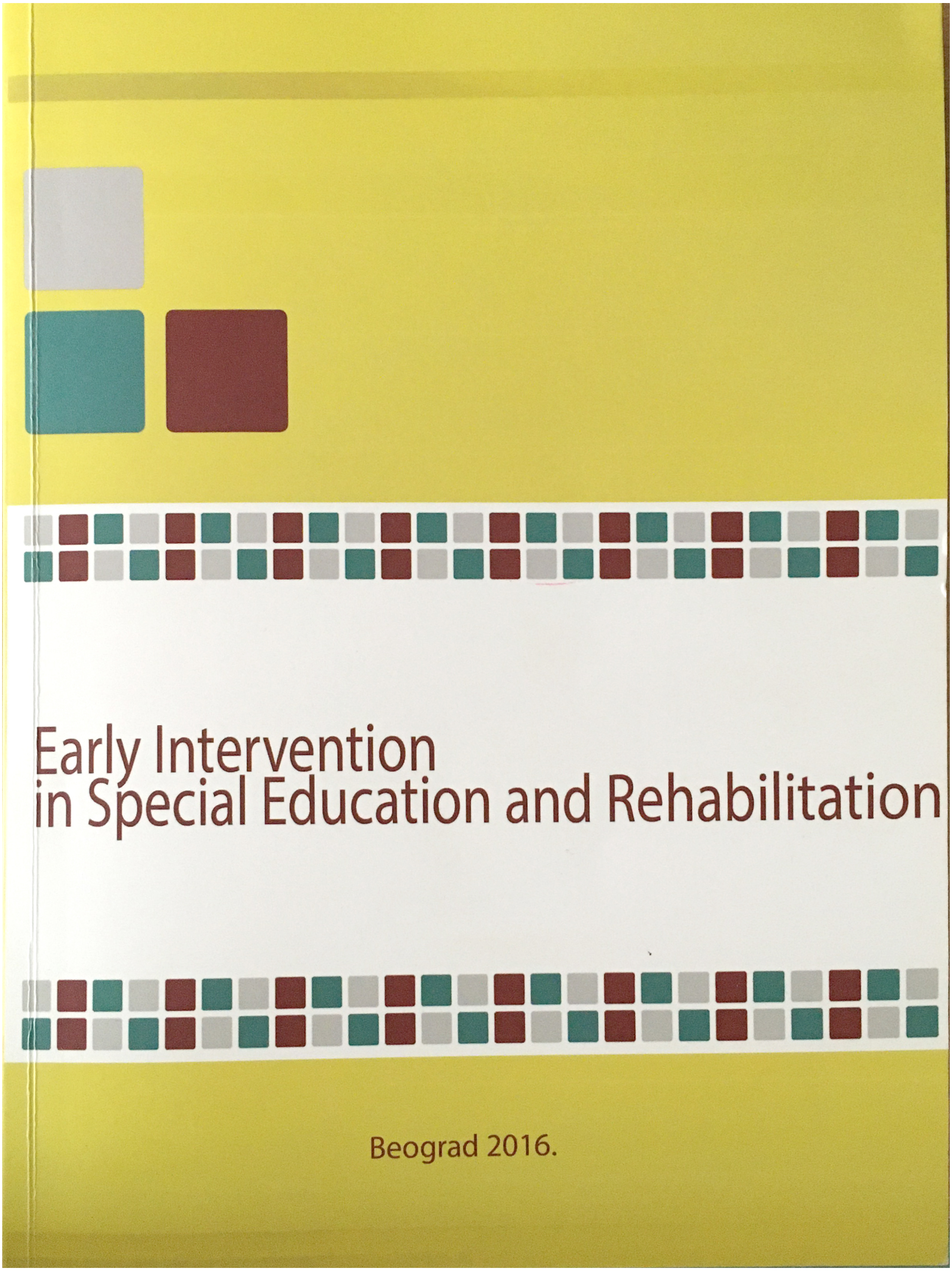

Early Intervention in Special Education and Rehabilitation

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PREFACE

Since the 60's of the twentieth century, the conceptions of early intervention and the implications of programming are being changed. Different programs are started to be applied under the assumption that it can have an impact on the ability and motivation to learn, and social competency of users. The international conference proceedings, presented to the readers, are entirely dedicated to the complex issue and problems of early intervention in children's age. It was conceived as a kind of response to the challenge of the social model of disability set in front of the special education and rehabilitation, and its related sciences, apropos the systematization of the current situation in the area of early intervention.

Early intervention in the area of special education and rehabilitation consists of multidisciplinary services, provided to children with medical risk for the correct development of outcomes, or with the developmental delay and disabilities, with the aim to improve child's health and well-being, strengthen of development capabilities, to reduce the impact of difficulties and developmental delay, prevent functional deterioration and to improve an adequately parenting and overall functionality of family. These goals are achieved through the individualized developmental and educational programs for children and through the various forms of family support.

One of the first practical steps in providing better environment of the early development of children is to support and educate parents to be safer and more effective in their role as parents, and to be able to encourage optimal development of the child.

In this publication, the studies which use a multidisciplinary approach in the early intervention and the latest instruments in its methodology and research were selected.

Early intervention is not limited to the first three years of life, when exist the aspirations of the child to overcome the basic and typical sensomotor skills; but expands on the age of 3-6 years old through exposure of the preschool programs cognitively oriented, together with intervention on the psychomotor development, also through the support of educational activities of the child at home and school it is extended to the 7-12 years old kids.

According to this approach, authors' articles which at the highest level of review present previous and new studies are grouped into four thematic areas:

1. EARLY INTERVENTION IN SPECIAL EDUCATION AND REHABILITATION
2. FUNCTIONAL ABILITIES OF CHILDREN WITH DEVELOPMENTAL DISABILITIES
3. INDIVIDUAL TREATMENT OF DEVELOPMENTAL DIFFICULTIES AND DISABILITIES
4. SOCIAL INCLUSION AND QUALITY OF LIFE IN PERSONS WITH DISABILITIES

The first thematic unit, consists of 11 papers, is to introduce the readers with the theoretical discourse of early intervention, and also with the practical implementation in work with children with motor, visual, auditory, speech disorders and autistic spectrum disorders. The results of these studies strongly suggest that a 'good foundations' of overall development is set during the first years, and that cannot be established without the provision of high-quality physical and social environment for the early development and learning of children.

Evaluation of functional abilities of children with developmental disorders shows significant interest of the professional experts in the field of special education and rehabilitation, and is a part of this thematic area with seventeen presented papers.

The third thematic area, presented with the fewest number of papers, shows multidisciplinary approach and wide prism of defectology work in the treatment of developmental disabilities and disorders.

The current problem of social inclusion and quality of life of people with disabilities is the most common in these conference proceedings. Fourteen original scientific papers deal with this problem.

Large number of original articles processed the most important aspects of early detection, functional diagnostics and interventions in different areas of special education and rehabilitation. Results of new research, presented by some authors, provide a significant improvement in terms of the methodology of work in early intervention.

EDITORS

Theme 1

Early Intervention in Special Education and Rehabilitation

EARLY INTERVENTION IN THEORY AND PRACTICE

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SUMMARY

For more than five decades it has been growing awareness in the world of the need and importance of early intervention, first of all, for children of poverty, and children with risks for discrepancies in development and developmental disorders. The field of early intervention for children with neurodevelopmental risk factors and developmental problems has been viewed over the times in different countries as having different importance. So, for example, in some countries, this area is part of the strategy which is adopted at the state level, in others the field of early intervention is elaborated in the documents at regional and local levels, and in some it is left to the experts and even non-governmental organizations which have recognized it as the great need of citizens. However, what we recognize as a common feature is the fact that the quality system of early intervention in any country can be established only if all segments act together starting from the national, regional and local level to the efforts of professionals and even non-governmental organizations. The aim of this study is that over a historical approach to early intervention and current knowledge in this field in the world and the European Union, we try to look at the situation and the need for future changes in this field in The Republic of Serbia in order to establish and further develop high-quality system of early intervention for children with neurodevelopment risk factors and disabilities, as well as family support system.

Key words: early development, early intervention, developmental disabilities, family

INTRODUCTION

Children's early development has been recognized in the world for more than five decades, if not as the most important, at least as an extremely important period in the life ofa child. To this statement point out a large number of studies, discussions and books dealing with the problem of early development and learning and their overall importance and influence on the later development, learning and behavior of individuals.

Overall findings that have been reached in this area clearly document the fact that individual development is a continuous process which takes place under the influence of both biological and environmental factors. A clear line of development results between biological and environmental factors can not be determined. However, it can safely be argued that in the prenatal period of development of an individual biologically determined processes have greater role, and in the postnatal period of development the environmental factors are predominant. "The results of numerous studies clearly suggest that during the first years of life 'good foundations' of overall development

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are established and that they can not be established without the provision of high-quality physical and social environment for the early development and learning of children. One of the first practical steps in providing better environment for the early development of children is to empower and educate parents to be safer and more effective in their role as parents and optimally able to encourage the development of child" (Nikolić, Ilić-Stošović, Ilić, 2010: 195).

Mentioned findings have opened up a new area for work of the different profile specialists in order to review the optimum conditions for the best possible developmental outcomes of children with neurodevelopment risks and developmental problems or disabilities. This new area was named *early intervention* which consists of a system of support measures provided to this population of children and family, too. The goal of early intervention is to ensure the prevention or mitigation of the problem of the child development, to facilitate the achievement of his maximum possible development and maintain emotional integrity of the family and the belief that parents could be competent advocates for their children in a complex system of developmental disability treatment.

Of course, providing quality facilities for learning and optimal incentives to young child cannot replace the biological conditions for learning if they are missing, but certainly, can make better use of existing ones. When we emphasize this we particularly have in mind the fact that the human development is the process which is by its nature cumulative and transactional. This means that each new learning relies and upgrades upon the previous one. However, if some children have certain developmental incapacity, they will accumulate if early intervention is not timely provided. Another so-called transactional character of a natural development refers to certain early interactions that are mediated between the child and persons close to him, which also represent the "episodes" of learning. These transactions between the child and his close persons are not unidirectional but have a dialectical character. In fact, not only the parents and other persons influence the child, but the child with his behavior influences them in return, which provide appropriate incentives for development. Thus, the range of development is determined by the transaction of biological factors, by the characteristics of the child's behavior and the quality of the environment in which the child develops (Collins et al., 2000; Sameroff & Fiese, 2000).

Early intervention - historical overview

Before moving to the analysis of the idea of early intervention, its settings and the specific values, we consider it necessary in order to understand its logic, to point out its roots and the circumstances in which it was created.

Early intervention as an idea, and later on as affirmative practice, appeared at least on four starting points:

- On the research of progressive authors who pointed to inequality in education, discrimination, segregation, marginalization, stigmatization, as well as to strategies to overcome the above problems;
- On the basis of critical theory and critical theory of education;
- On certain scientific research on individual differences (brain function, types of intelligence, etc.);

- On certain political documents which affirm the value of every man and child (Declaration of Human Rights and the Convention on the Rights of the Child).

The idea of early intervention was launched in America in 1954 when the Board of Education, based on the verdict of the Supreme Court (brought against segregation of the Blacks' children), denounced the existence of a separate education system for The Blacks and upheld the universal right of all children to adequate education. According to this it was highlighted the need for an integrated public education, which should promote social harmony and educational capital (Ramey and Ramey, 1998).

Some empirical research papers and studies published during the 1960-ies brought a wealth of information about the high level of inequality based on socio-economic status of the children's families. In these works it was noted that the success/failure of children at school depends on several factors, namely: family background, professional and educational status of parents, language and language culture, extreme poverty, etc.

In opposition to the concept of inherited intelligence and traditional psychometric measurement, a small group experimentally and clinically oriented psychologists began to explore the importance and the role of early experience (Hebb, 1949; Harlow, 1958; Hunt, 1961). In all of these authors' studies, it is highlighted the importance of early experience for brain development and behavioral development of children. While not denying the role of genetics to individual differences, each of these authors emphasized and provided explanations for the place and the role of early experience for the overall cognitive, social and emotional development.

Another group of psychologists conceived and carried out systematic researches that involved young children and their families. These researches were inspired by certain studies (although methodologically controversial) that highlighted the evidence of the power of early experiences to change the development of intelligence and the ultimate life development of institutionalized children with intellectual disabilities (Ramey and Ramey, 1998). The results of these studies have opened and paved the way for further systematic studies on the importance of early intervention, especially for children who come from uneducated and poor Black families (Caldwell, 1973; Weikart, Bond & McNeil, 1978; Gray, Ramsey & Klaus 1982). The obtained results of series of studies laid the corner stone for *Project Head Start* (which began in 1964) as a national policy in order to create better conditions for the readiness of schools to influence the social development of the so-called "vulnerable children" (Zigler & Valentine, 1979; Zigler & Muenchow, 1992).

To all of the above mentioned should be added so-called "Sputnik shock" which further influenced the reform of the education system in America. In fact, after the Soviet Union had launched the satellite (called Sputnik) into the Earth orbit in 1957 with the aim to record and broadcast the electronic signals, many countries felt the need for urgent changes in their education systems. In America, the educational reform became a national priority from pre-school to university level. It underlined the importance of an *early start* and developed early intervention programs for poor children, then the system of early intervention for children with disabilities.

USA is among the first countries to try to regularize the position of children with disabilities and well before the adoption of the Convention on the Rights of the Child and other international documents. In 1975 The Education for All Handicapped Children Act was adopted which aimed to ensure free and appropriate education. This in the following years helped creation of a complex system of special-education system throughout America. Over the years this document was amended and in 1990 the Individuals with Disabilities Education Act was passed (IDEA). It contributed to significant changes in the education system, allowing it to be functional to children with disabilities ranging from three years of age, as well as providing certain services to children from birth to three years old. This influenced creationand spreading of a set of system services and support across America, which was called *the system of early intervention*. Also, this document had significant implications not only for children with disabilities, but also for all children because it specified the implementation of the *Individual Educational Plan* (IEP) in order to meet the individual needs and abilities of each child.

"*Early intervention* is a term that refers to a broad array of activities designed to enhance a young child's development. Ideally, early intervention starts with a comprehensive assessment of the child's and the family's strengths and needs and extends through the provision of appropriate supports and services to active monitoring and re-evaluation as the child develops" (Ramey and Ramey, 1998: 110).

The right to be included in the system of early intervention had babies and all small children with diagnosed disabilities, but also those children who belonged to children at risk. The system of early intervention was supported by parents, advocacy organizations and specialists in early childhood who recognized and highlighted the importance of early experiences for the prevention of secondary consequences. This approach provided a certain support to children and families who lived below the poverty line. The most famous programs in *Head Start* are: Head Start programs for children of three and four years, Parent and Child Centers, Programs for the overall development of the child and, somewhat later, Early Head programs for infants and toddlers. It is interesting that all Head Start programs had to include children with disabilities.

In addition to the federal early intervention programs there were hundreds of early intervention programs developed and funded by the federal, local and private sources. These programs included the so-called programs of home visits and center-based programs for high-risk children and families (Roberts, Wasik, Casto & Ramey, 1991; Coie et al., 1993; Ramey & Ramey, 1996).

Reasons for early intervention

Necessity of early intervention is, among other things, emphasized in order to prevent occurrence of intellectual disability or low intellectual development in children who come from families that do not provide adequate stimulation during the early years of life. Evidence for this is found in the book *Rethinking the Brain: New Insights Into Early Development* (Shore, 1997) which stresses the importance of early experience for brain development, as well as improving opportunities for learning and development in children through the first three years of life.

The results of other studies performed at the end of the twentieth century in America lead to the things mentioned above (Boyle, Decoufle & Yeargen-Allsopp, 1994; Carnegie Task Force on Meeting the Needs of Young Children, 1994). The obtained results accentuate that there is an increased risk for lower, below average intellectual functioning and poor readiness for school just among those children who come from families with the lowest socio-economic status and low education level of parents (especially mothers). That is exactly where you can see the reasons for the inability of children to meet the demands placed on them by schools, increased failure in school, repeating grades, engaging in special education and dropping out of school, but also increased risks for early pregnancy, juvenile delinquency, welfare dependency, unemployment and similar. As a conclusion of completed research it is pointed out the fact that all these might have been prevented that with these children early and sustained intervention was organized.

When it comes to the population of children with disabilities and invalidity, it is emphasized that their development requires specialized strategies which need to start from their habits, levels and learning opportunities. Although there is not enough scientific evidence about the effects of early intervention programs with this population, it is stressed that parents and experts point out a significant great success in competence of children with Down syndrome, spina bifida, visual and hearing impairments, even children with autism if they were involved in intensive and systematic programs of early intervention. The reasons for the continued expansion and improvement of early intervention to a heterogeneous group of children with disabilities and invalidity can be found and justified in these personal experiences and needs that parents become familiar with the possibilities of how to meet the necessity of their children best (Ramey & Ramey, 1998).

In addition to the above, Ramey and Ramey point out the theory that children under the influence of early experience can change the intellectual competence over time illustrating all by the image we convey here.

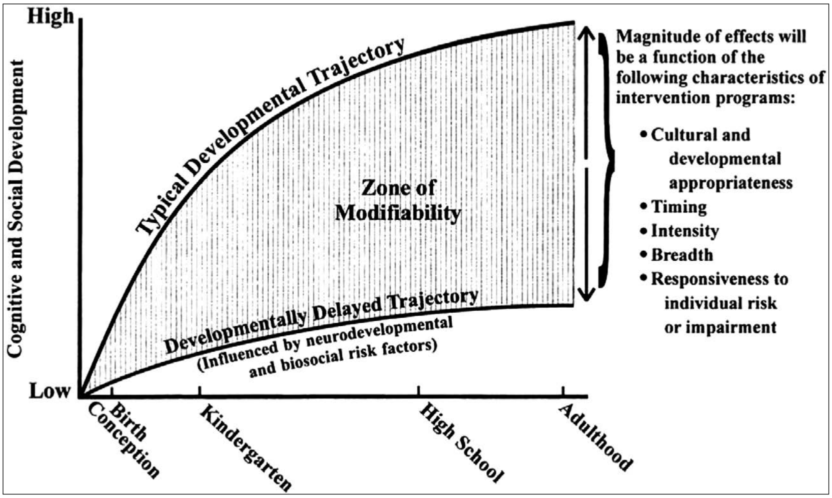

Figure 1 Hypothetical Range for Experience-Driven Cognitive Neurodevelopment

The main challenge is the question whether additional programs for children who did not have enough incentives in the first five years of life can accelerate their developmental level. These programs should help compensate their slow and under-average development and facilitate the acquisition of relevant skills that their peers mastered. As a basic constraint in achieving this objective is allocated number of hours the child spends in the context of corrective programs in relation to the number of hours in the family. As this difference is very large, it is emphasized the need that almost all early intervention programs (and later school programs) include families as active partners in the learning process of their children. Success in the context of early intervention programs for children with risks is broadly determined by the positive impact on the intellectual and socio-emotional development that they would not achieve in the absence of early intervention. Expectations are that the inclusion of these children in early intervention programs will enable their return to standard developmental frames and ensure optimal further development after completion of the program of early intervention (Guralnick, 2004; Guralnick, 2005).

Ramey and Ramey, analyzing early intervention programs, argue that they are typically ambitious in terms of set goals, wide in range of services and support offered and designed so that they can respond to the individual needs of some children and their families. These characteristics of early intervention programs prevent them from easy classification and mutual comparison. Also, they emphasize that the programs contain phrases such as "comprehensive, coordinated and community-based", "individualized", "culturally sensitive", "family empowerment" and thus reflect ideological basis and do not offer a concrete plan of action. According to these views, the authors offer a general conceptual framework for the clarification of objectives, components and outcomes of development programs for early intervention, which is shown in Figure 2.

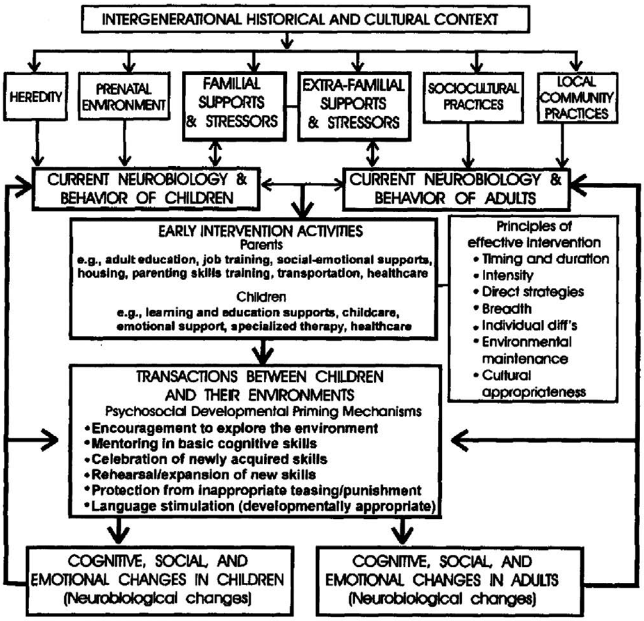

Figure 2 Schematic Portrayal of Biosocial Developmental Contextualism Applied to Early Intervention

Based on Figure 2 it can be seen that the proposed conceptual framework is intergenerational because it refers both to the child, as well as to the certain development of parents. It presents important sources of influence on cognitive, social and emotional development of children and their parents, but also offers broad categories of intervention services. Based on the conceptual framework, it can be concluded that current neurobiological and behavioral status of the child represents the cumulative effects of their personal history. These effects are reflected in the quantity and quality of transactions between the children and the environment and, therefore, are the primary ways of learning for young children. Prior to the implementation of early intervention programs information about the child and the family within the wider social environment are collected. An individualized assessment of the child identifies the specific risks and/or disabilities and estimates the possibilities of family, in accordance with its values, beliefs and routine, to become an integral part of the strategy of early intervention programs implemented by the community.

Offered conceptual framework includes a set of resources and activities that could be used to promote changes in children, parents and family environment. So, for example, support for early intervention programs can be focused on: "a) the family as a unit (e.g. adequacy of income, housing, and healthy lifestyles); b) parents or primary caregivers (e.g. adult education, job training, family management skills); and c) the child (e.g. early childhood education and specific neurodevelopmental therapies). These resources and supports may be provided directly by an early intervention program, through referrals to other services and by strengthening natural support systems" (Ramey & Ramey, 1998: 114).

Changes in the developmental status of the child and family take place under the influence of specific psychosocial mechanisms. Ramey and Ramey, on the basis of literature, singled out and incorporated into the conceptual framework six primary psychosocial mechanisms associated with positive impacts on cognitive, social and emotional status of children: a) encouragement to explore the environment, b) mentoring in basic cognitive and social skills c) celebrating new skills, d) rehearsing and expanding new skills, e) protection from inappropriate punishment or ridicule, and f) stimulation in language and symbolic communication. Of course, by listing the six mechanisms we have not exhausted all the possibilities that could be used for the purpose of cognitive, social and emotional changes in children, but these are listed only as the most basic. Their daily presence ensures normal development of children. In order to provide the same impact of psychosocial mechanisms to children with disabilities it is often required the use of so-called assistive technology (Ramey & Ramey, 1992; 1998).

The presented general conceptual framework contains six principles that relate to the question of efficiency of early intervention, which we would explain in brief. Principles were abstracted from the literature related to the study of children from economically poor families, children with biological risk factors, children with combined psychosocial and biological risks, as well as children with disabilities and invalidity which had been diagnosed in early childhood. However, we need to emphasize that examined effectiveness of early intervention programs was more related to early intervention programs in children than with parents, as well as more on cognitive than on social development.

Principle 1: *Principle of developmental timing*. Early intervention programs that begin at an earlier calendar age and last longer provide greater effects than those which begin later in time with shorter duration. The evidence for this can be found in the context of the results of five studies which point out the greatest effect of early intervention on children's cognitive and social development: the Abecedarian Project (Campbell & Ramey, 1995), the Brookline Early Education Project (Hauser-Cram, Pierson, Walker & Tivnan, 1991), the Milwaukee Project (Garber, 1988), Project CARE (Wasik, Ramey, Bryant & Sparling, 1990) and The Infant Health and Development Program (1990; Ramey et al., 1992).

Principle 2: *Principle of program intensity.* Early intervention programs that are more intensive (in terms of number of home visits per week, number of hours per day, days per week and weeks in a year) provide greater positive effects than those containing less intensive intervention. Two studies point to such benefits in early intervention with children aged 3 and 4 years: the Perry Preschool Project (Weikart et al., 1978) and the Early Training Project (Gray, Ramsey & Klaus, 1982). Both programs were programs of high intensity. In contrast to these results, there are many programs that were of low intensity and did not have a significant effect. So, for example, as many as 16 studies of early intervention for children with disabilities conducted by Utah State Early Intervention Research Institute (White, 1991), showed no effects and involved a full-day programs and home visits during the weekend.

Principle 3: *Principle of direct provision of learning experiences.* Early intervention programs for children which allow the acquisition of direct learning experiences have greater and more lasting effects than the programs which indirectly affect changes of children's competences (programs that training only parents) (Casto & Lewis, 1984; Madden et al., 1976; Scarr & McCartney, 1988; Wasik et al., 1990).

Principle 4: *Principle of program breadth and flexibility.* Early intervention programs that provide comprehensive services and use multiple ways to enhance and improve child's development show greater effects than early intervention programs that are narrow in its focus on the range of services they offer. Already mentioned programs can illustrate this: the Abecedarian Project, the Brookline Early Education Project, the Milwaukee Project, Project CARE, The Infant Health and Development Program, as the program Mobil Unit for Child Health (Gutelius, Kirsch, MacDonald, Brooks & McErlean, 1977).

Principle 5: *Principle of individual differences in program benefits*. Some children have greater benefits from involvement in a specific program of early intervention than others. These results were observed in children with different risk factors. Mentioned results emphasize the need to involve children in various programs of early intervention in order to get the same outcomes (Hunt, 1961; The Infant Health and Development Program, 1990; Cole, Dale, Mills & Jenkins, 1993).

Principle 6: *Principle of ecological domination and environmental maintenance of development.* Initial positive effects obtained by including children in a particular early intervention program over time may be reduced if the child fails to be provided adequate and sustained multi-year support in the environment in order to maintain positive attitudes and behavior during the continuation of further learning in school (Lazar et al., 1982; Garber, 1988; Schweinhart & Weikart, 1993; Campbell & Ramey, 1995).

Our analysis in this part of the work we would end up by pointing to several important moments that analysis implies. In fact, certain scientific research, started primarily in the middle of 20th century, proved the extraordinary potential of early childhood, as well as unique opportunities that in this course of time the child's development can be influenced. These findings point to the fact that this is a critical period in which the child's developmental outcomes can be affected. Researches and certain experiences over the past fifty years provide quantitative and qualitative evidence that early intervention increases the developmental potential of the child and reduces the possibility of occurrence of developmental difficulties (Blair, Ramey & Hardin, 1995; Hadders-Algra, 2001; Ramey, Ramey & Lanzi, 2007), improves the functioning of the family by providing certain forms of support and assistance (Saylor, Boyce & Price, 2003; Benzies, Harrison & Magill-Evans, 2004), thus providing maximum benefit for the child and the family in society.

Finally, we can conclude that although there have been relatively few studies on efficiency characteristics of early intervention programs, in most studies several factors that indicate the highest efficiency can be pointed out. These characteristics of early intervention programs include: a) the child's age at the time of implementation of early intervention, b) participation of parents and c) the intensity and/or the amount of structure programming model.

Early intervention in Serbia- current situation and prospects

According to previous exposure we can conclude that early intervention in the world in theory and practice has existed for more than fifty years. However, the basic issues of early intervention and the manner of its provision have been continually changing over time. At the beginning of 21st century, the fundamental question in the field of early intervention is the issue of how to make the most of current knowledge in this field and run and use existing resources to improve the system of support for children with neurodevelopmental risk factors, developmental disorders and disabilities, as well as to help their parents (Meisels & Shonkoff, 2003).

At the international level despite the differences that exist in the field of early intervention (which are caused by a variety of solutions in national law, tradition, health insurance, and education, etc.), we can notice the presence of a new paradigm that is reflected in the importance of providing early support directed towards both the child and his family, using all available resources for this goal, as well as the establishment and expansion of the network of early intervention. In addition, with such systematic approach, early intervention becomes increasingly trans-disciplinary and team work.

At the EU level Eurlyaid Working Group (consisting of representatives of parents and experts organizations) adopted a common vision on intervention for children with neurodevelopmental risk factors and developmental disorders (De Moor, van Waesberghe, Hosman, Jaeken & Miedema, 1993). This document defines the basic concepts in this area, established stages of the intervention process, specific target groups and necessary conditions for achieving high-quality early intervention. In this way, a little more than twenty years ago, in the European area a common conceptual framework was built as a precondition for conceptualization of systemic approach to the field of early intervention.

Also, university education programs for the training of specialists in the field of early intervention have emerged and been on the rise in the area of the European Union.

Austria, for example, has been educating professionals for early intervention for almost two decades at the Universities of Vienna and Graz. In addition, the European project has been launched in order to analyze the studies in this area and build standards for their evaluation.

As for the former Yugoslavia, we can say that the Republic of Croatia in 2006 launched the Postgraduate specialist study program "*Early intervention in educational rehabilitation*" at the Faculty of Education and Rehabilitation as a response to the need for professional training for work with the youngest age children born with neurodevelopmental risk factors or developmental disabilities, as well as to work with their families. In addition, in Croatia, starting from 2009 several symposiums dedicated to early intervention in childhood have been held.

The question is where Serbia is today when it comes to early intervention? The need to care for the most sensitive and the most vulnerable groups of children has been recognized in the Republic of Serbia and reflected in series of documents adopted by the government. Apart from taking over certain international obligations in respect of children's rights, appropriate legislation was adopted at the state level where we can recognize the intention of the state to regulate in a systematic way the approach to solving the problems of the social status of children. When we point out this, above all, we think of: Strategy to improve the situation of persons with disabilities in the RS (Off. Gazette of RS, no. 1/07); Regulation on the national program of health care for women, children and youth (Off. Gazette of RS, no. 28/2009); Code on indicators of health care quality (Off. Gazette of RS, no. 49/2010); Strategy for Development of Social Protection (Off. Gazette of RS, no. 108/2010); National Plan of Action for Children (NPA) (2004); Strategy for vision achievement - the policy, actions and measures: Education Development Strategy in Serbia until 2020 (Off. Gazette of RS, no. 107/2012); Health care plan from the compulsory health insurance in the Republic of Serbia in 2015 (Off. Gazette of RS, no. 146/2014) and others.

By adopting these documents, one gets the impression that in our country early intervention has been accepted and recognized as a capital investment for the development of children of the earliest age. However, it would not be too freely to say that it is only on a declarative level because in practice there are still significant problems and obstacles in the way of implementation of early intervention. In fact, in our country the system prerequisites for the organization and implementation of early intervention have not been created yet. The absence of a national strategy in the field of early intervention, the incompleteness of legislation and the issue of funding of early intervention programs make the basic barrier along the way. In addition to these, there are others, not less important obstacles in the way of building a systematic approach to the field of early intervention and they are reflected in the absence of a database on the number and structure of children with neurodevelopmental risk factors and developmental disabilities; in the absence of institutions that would systematically deal with the implementation of early intervention; in the absence of inter-institutional and inter-section cooperation; in the lack of experts and framework for assessing the needs of children and their families, as well as assessment instruments; in the lack of centers / services for the provision of services to children and families, etc.

In the Republic of Serbia, as far as we know, licensed projects or programs of early interventionare not carried out, but occasionally, certain projects from the field of early intervention are realized by associations or non-governmental sector, whose efficiency, at least so far, we have not had a chance to be familiar to, and we do not know whether their evaluation was performed. This should be our future task, too.

When it comes to the provision of experts in the field of early intervention, we need to point out the fact that Serbia has recently made a step in that direction. Namely, at the Faculty of Special Education and Rehabilitation since 2015 accreditation, within the syllabus of basic academic studies Study program of Defectology (Modules Disorders and eye impairments and Motor disorders and impairments), the teaching field of *Early Intervention* has been introduced as an optional subject. However, one might ask whether it is enough to study this issue only as an optional subject or it should be compulsory subject at this level of study. Also, there is the question whether there is a need to study this area only in this study program and on mentioned modules or, there is a need for it to be an integral part of all study programs at this level. In addition, to our knowledge, Faculty of Medicine in Novi Sad has submitted an accreditation for Postgraduate specialist study program "Early Intervention". All this makes positive impulses that enable and ensure acceleration of changes in the field of early intervention in our country in order to create optimal conditions for its organization and implementation for the benefit of children, their families and society as a whole.

To all this must be added the fact that this year we titled *4th International scientific conference "Special Education and Rehabilitation-Early Intervention".* Consequently, this would be the first scientific meeting in our country, which in its focus has early intervention, where we want to draw attention to the necessity of creating the system preconditions for organizing and implementing early intervention. On the way of building a quality system of early intervention in our country, all segments must act synergistically – from the state level, through the regional and local level, to efforts of experts, associations and NGOs. Having this in mind, at this meeting through appropriate fundamental debates but also from other people's experiences, we must form conclusions that will give additional impulses to building a quality system of early intervention in our country.

CONCLUSION

Children's early development in the world for more than five decades has been recognized as a very important age. A large number of researches, studies and books that deal with early childhood development and early experiences and their impact on later development and learning of the individual indicate to this statement. Overall findings that have been reached in this area clearly indicate that the critical period for the development of the individual is the period immediately after birth and during the first years of life. During this period the most tremendous changes in motor, cognitive, linguistic, emotional and social development occur. These findings have opened up a new area for work of different profile specialists to review the optimum conditions for the best possible developmental outcomes of children with neurodevelopmental risks and developmental disorders and disabilities. This new area was named *early intervention*. Early intervention represents the wide system of support measures provided to children and families in order to prevent or mitigate the problems of child development, but also to maintain emotional integrity of the family and the belief that the parents could be competent advocates for their children in a complex system of treatment of developmental disabilities.

What is generally recognized and accepted is a comprehensive developmental framework that allows us to understand certain mechanisms through which various forms and programs of early intervention produce certain effects.

Bearing in mind the current state of knowledge related to the field of early intervention, we believe that Serbia has not yet embarked on the path of their capitalization and has not initiated and used all available resources to improve the system of support for children with neurodevelopmental risk factors, developmental disorders and disabilities, and their families, too.

We believe that *4th International scientific conference "Special Education and Rehabilitation-Early Intervention"* is an opportunity that must be seized in order to form opinions and conclusions that will give additional impulse to acceleration of changes in the field of early intervention in our country but for the benefit of children, their families and society as a whole.

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EARLY INTERVENTION IN THE WORLD: IMPLICATIONS FOR IMPROVEMENT IN SERBIA

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SUMMARY

In this study, it was collected and analyzed literature that deals with early intervention. By analyzing the available literature, papers were grouped into three groups. The first group consists of the studies relating to research legislation in the field of early intervention. The second group of papers relating to the beneficiaries of early intervention services (children and families), while the third group of works deals with services, respectively support services.

Early intervention implies support system for children with neurodevelopmental risk factors, developmental disorders and disabilities from birth up to three years, and their parents. The goal of early intervention is detection, prevention and stimulation. In order to conduct a plan of early intervention in the best possible way, it is necessary to establish as soon as the correct diagnosis in a child, to engage families and to create a plan with clearly achievable and measurable goals. In order to facilitate the successful organization and implementation of early intervention, it is necessary that more areas work together: the organization of services and legislation, evaluation, collaboration with families, teamwork and the ability of the team.

In the world, the system of early intervention found its place in the last century, while in the Republic of Serbia there are still systemic deficiencies. In this respect, this paper could have practical guidelines aimed at establishing new or improving the existing system of early intervention.

Key words: early intervention, support, children with disabilities

INTRODUCTION

For specialists of different professions, terms of early intervention has more meaning. The word "early" refers to the most critical period in a child's development, from birth to three years, while the term "intervention" means the implementation of the program, which aims to maintain or improve the child's development in the natural environment as a family member. Period of early development is very important for learning and social participation of every child, and it is characterized by intense motor, cognitive, linguistic, emotional and social development. The concept of early intervention begins in the United States, in the seventies of the 20th century. Children who are late in development or have specific health conditions, are included in the system of early intervention. However, in different countries, early intervention, is given a different character. In some countries, this area is a part of the strategy to be ratified at the state level, somewhere the area of early intervention is operationalized in

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the documents at the regional level, somewhere it is left to the cities to take care of the system of early intervention at the local level, and in some countries the area of early intervention remains on professionals and / or non – governmental sector who are developing that area due to the identified needs of its citizens (Wertlieb & Ferić, 2015).

In special education and rehabilitation, early intervention is defined as a system of support for children with neurodevelopmental risk factors, developmental disorders and disabilities from birth up to three years and their parents. Major goals of early intervention are reaching maximum possible development of the child; prevention or mitigation of development problems; help in learning and social inclusion; maintaining emotional, and functional integrity of the family (Golubović & Slavković, 2015). As outcomes of early intervention are: a reduction in the possibility of the occurrence of disability, alleviating existing difficulties and reduction of functional deterioration, promotion of infant parenting, as well as improving the functioning of the family. It can be said that the positive outcomes of early intervention are viewed in three ways, in relation to the child, parents and society. If we look from a child perspective positive outcomes related to "reduce or prevent unwanted behaviors or other disturbances and difficulties that may arise, develop cognitive skills, progress in speech – language development, progress in socio – emotional development" (Blair, Ramey, Hardin, 1995; Hadders-Algra, 2001; Ramey & Ramey & Lanzi, 2007). As for the parents, the research results show that the positive effects of early intervention reflects in "identifying the resources and abilities of the family itself, improving the interaction between the child – a parent, a better emotional relationship between them, and of course the parents become more confident in the approach to the child and not feel responsible for a state in which the child is" (Benzies, Harrison, Magill-Evans, 2004; Pelchat, Bisson, Ricard, Perreault, Bouchard, 1999; Saylor, Boyce, Price, 2003). Finally, the benefits to society are also numerous and manifested through the "reduction of the need for social protection, less dependence on other members of society, and the long -term savings in terms of later interventions" (Golubović & Slavković, 2015).

A number of authors in their research, that are done at the beginning and the end of the eighties of the 20th century, single out three fundamental objectives for the creation of an early intervention plan:

1. After making a diagnosis in a child, as soon as possible to create a development plan. "Through interventions on the birth or soon after diagnosis, reduce the risks for disability or developmental disorders" (Cooper, 1981; Garland, Stone, Swanson & Woodruff, 1981; Maisto & German, 1979; Strain, Young & Horowitz, 1981).
2. Engaging families in the development and realization of made intervention plan. Research shows that parents of children with disabilities need support to acquire skills which can help them to cope with the needs of their child. Also, parents should be trained to implement the intervention program at home and to reduce the stress that affects the health of the family. Both of these factors play an important role in the implementation of the intervention plan (Beckman-Bell, 1981; Cooper, 1981; Garland et al., 1981; Karnes, 1983; Lovaas & Koegel, 1973; Shonkoff & Hauser-Cram, 1987).
3. The plan should be highly structured and to provide clear and measurable targets (Shonkoff & Hauser-Cram, 1987).

We believe that such structured goals should be the basis for the establishment of a system and implementation of plan for early intervention, today.

METHOD

The aim of this study is to examine all available literature that shows early intervention system in the world, which conceptually and methodologically fit the needs of special education and rehabilitation. In this narrative review of the literature will be presented and analyzed papers that can be a guideline for creating a system of early intervention in the Republic of Serbia.

For the purposes of this study, carried out an overview of the expert and scientific literature by searching electronic databases which are available through Google Scholar and the Serbian Library Consortium for Coordinated Acquisition (KoBSON). By searching service Science Direct, Wiley Interscience, Springer / Kluwer, SAGE Publisihing and EBSCO have been collected and analyzed articles in the content who farmed the issue of early intervention. During the time used the following key words: early intervention, children with disabilities, risk children, children with delays in development, support services, assessment of children, evaluation, legal regulations. In consideration are taken research that have been published from 1970 to 2015, and all papers can be grouped into three groups. The first group consists of the works relating to research legislation in the field of early intervention. The second group of papers relating to the beneficiaries of early intervention services (children and families), while the third group of works deal with services, respectively support services. Of the total number of reviewed papers, we selected those which correspond to methodology of special education and rehabilitation (biopsychosocial approach), by our assessment.

THE RESULTS

Legislation in the world and in the Republic of Serbia

Analyzed papers dealing with legal regulations are divided into those relating to the organization of early intervention system in the United States (5) and in Europe (4). In order to facilitate the successful organization and implementation of early intervention, it is necessary that more areas work together: the organization of services and legislation, evaluation, collaboration with families, teamwork and the ability of the team. Services dealing with early intervention in childhood based its work on a number of legal documents in the field of health care, education and social protection.

As the authors state (Danaher, 2002; Rosenberg, Zhang & Robinson, 2008; Schiller, Adams & Nelson, 2005) in the United States, according to the Education of the Handicapped Act Amendments (EHAA, Public Law, 1986) part H was established of the discretionary program for the state to allow the development of a comprehensive system of early intervention services for infants and young children with disabilities or developmental delays. According to this act, early intervention services are intended for population of children who differ significantly in terms of the type and severity of their disability (Meisels & Wasik, 1990). In 1990 EHAA was amended in the Individuals with Disabilities Education Act (IDEA). The Individuals with Disabilities Education Act (IDEA) is a law ensuring services to children with disabilities throughout the nation. IDEA governs how states and public agencies provide early intervention, special education and related services to more than 6.5 million eligible infants, toddlers, children and youth with disabilities. This law provides the basis for the establishment of early intervention services and explains how early intervention services should be implemented. In addition to the emphasis on intervention in the family, reinforces the importance of IDEA (highlights) opposite the importance of prevention (in terms of) treatment (Johnson, 1994) and promotes the well-planned and coordinated transition of children from preschool or school program. Early intervention helps children to go through phases of development through a wide range of services. Infants and toddlers with disabilities (birth-2) and their families receive early intervention services under IDEA Part C. Children and youth (ages 3-21) receive special education and related services under IDEA Part B. Part C is a $436 million program administered by States that serves infants and toddlers through age 2 with developmental delays or who have diagnosed physical or mental conditions with high probabilities of resulting in developmental delays (babies in risk and infants and toddlers with delays in development are included in Part C of the IDEA). Early intervention includes service providers for infants and toddlers if they are located in Part C of the Individuals with Disabilities Education Act (IDEA). The Part C regulations provide a framework for effectively identifying, locating, and providing early intervention services to all eligible infants and toddlers with disabilities. Part of that framework includes the post-referral activities of screening, evaluation, and assessment (http://www.parentcenterhub.org/repository/partc-module4/). Part C of the Individuals with Disabilities Education Act (IDEA), describes the rules and regulations which the participating countries have to look at how to establish services and early intervention system. Table 1 provides an overview of differences between Part C (which defines early intervention services for children from birth to 3 years) and Part B (which defines school programs for students aged 3 to 21 years) (Danaher, 2002).

Table 1 *Comparison of educational programs in relation to the age group*

	0 - 2 years	3 - 5 years	6 - 21 years
Legislation	IDEA, part C	IDEA, part B	IDEA, part B
Program	Early intervention	Special education	Special education
Type	law	necessarily	necessarily
Availability	noncategorical	categorical	categorical

	0 - 2 years	3 - 5 years	6 - 21 years
Provided services	16 basic services, including occupational and physical therapy, speech therapy and special education. Interdisciplinary and transdisciplinary assessment. Individualized family service plan. Concentrated on the family. Coordination of services.	Close services only as a support to special education. The specific assessment for a particular discipline. Individual educational program. In theory focused on the family, in practice concentrated on the child. Coordination of services is recommended, not required.	Close services only as a support to special education. The specific assessments for specific discipline associated with education. Individual educational program. Focused on children with an emphasis on curriculum standards. Coordination of services is recommended, not required.
Location	Natural environment	In the house, center, school	At school

The purpose of Part C of the Individuals with Disabilities Education Act (IDEA) is that each state provides assistance in maintaining and enforcing a comprehensive, coordinated, multidisciplinary and intersectional system of early intervention services intended for infants and young children with developmental delays and their families.

Group of authors dealing with the early intervention system in Europe (Košiček, Kobetić, Stančić & Joković-Oreb, 2009; Santa & Hoein, 1999; Skivenes, 2011) states that there are still no uniform principles in the implementation of early intervention in countries that carry out the same, nor equal access for all children. However, some positive aspects that have proven effective can be observed in models of early intervention in Norway and Germany. The characteristic of the Norwegian model, which has proven to be functional, is that every child with disabilities has a right to legally prescribed on an individual plan and program to be drawn up in cooperation with parents. The local authority is obliged to allow the professional and economic assistance to children with disabilities and their families, and coordinate and control the use of these funds. The law also provides for the right (from the birth of a child) to special education teachers (special educator and rehabilitator) which monitors the child's development and makes recommendations for the development program and how should it be implemented. In case of disagreement, the parents can appeal to the proposed development program for their child. Special educator and rehabilitator can come to the house (until the child goes to kindergarten) and an institution for pre-school education. In addition, the child is entitled to a personal assistant, and preschools have their own assistants who help children (Košiček, Kobetić, Stančić & Joković-Oreb, 2009). As positive aspects of early intervention in Germany cited the easy availability of support for the family, a high level of expertise of personnel involved in the process of early intervention. In addition, it is emphasized the existence of a professional team, then good connections among experts, but also among all institutions that provide support to children and their families (Early Childhood Intervention 2005). Having learned from the experiences of developed European countries, in the eighties of the last century, Croatia has also organized special education expert procedure to be conducted in families of children with disabilities. The main objectives of these mobile services are manifold: to support parents in the rehabilitation process, the early involvement of the child and family in the rehabilitation, maintenance of continuous rehabilitation, family support for inclusion in preschools and other organized forms of work (Kniewald 1983, according Košiček et al., 2009).

In our country, there are numerous pieces of legislation that fulfils its international obligations with regard to rights and tackling the social status of children. Ratifying the legislative acts such as: the Plan of health care from the compulsory health insurance in the Republic of Serbia for 2015 (Official Gazette of RS, no. 146/2014), the Ordinance on the quality indicators health protection (Official Gazette of RS, no. 49/2010), Regulation of the national program of health care for women, children and youth (Official Gazette of RS, no. 28/2009), the National plan of action for children (NPA), Strategy to achieve the vision – policy actions and measures: education development Strategy in Serbia to 2020 (Official Gazette of RS, no. 107/2012), Social welfare development Strategy (Official Gazette of RS, no. 108/10), Strategies to improve the position of persons with disabilities in the Republic of Serbia (Official Gazette of RS, no. 1/07) and others, early intervention is recognized and accepted, and through a legal documents are identified the main problems in achieving, protecting and promoting the rights of the child (Golubović & Slavković, 2015). However, although there are numerous acts that rely to early intervention, the lack of legislation in the Republic of Serbia is the lack of national strategy for early intervention, vagueness of the legislation when it comes to the financing of programs, as well as undeveloped system prerequisites for the implementation of early intervention. Also, there is no database of children i.e. data collection system on children with neurodevelopmental risk factors and disabilities. This is one of the reasons why there is a lack of reliable data on the number, age, severity of disability and social position. As an attempt to overcome the shortcomings, on the basis of the Law on Health Care (Official Gazette of RS, No. 107/05, 72/09 – other Law, 88/10, 99/10, 57/11, 119/12, 45/13 – other Law and 93/14) and the Law on Government (Official Gazette of RS, no. 55/05, 71/05 – correction, 101/07, 65/08, 16/11, 68 / 12 – US, 72/12 – US and 44/14), ratified the Regulation on the National Program for the promotion of early childhood development, which include activities on the promotion, protection and improvement of early child development in the first years of life (Official Gazette RS, no. 22/2016).

Services and beneficiaries

Children

The classification of children who are eligible for early intervention services provided by many authors (Ramey & Ramey, 1998; Rosenberg, Zhang & Robinson, 2008). The right to early intervention services have babies and children, if fall into one of the following categories:

1. Identified Risk – This group includes babies or small children if they are diagnosed as Down syndrome or cerebral palsy.
2. The delay in development – This group includes babies and children in which the results of diagnostic tests or assessment have shown that there is a delay in one or more developmental areas: cognitive, motor (including vision and hearing), communication,

social and emotional areas and customization options. States differ among themselves in relation to the criteria that have to determine the degree of delay in development compared to the instruments, or procedures used.

3. Risk Kids – This category includes the discretion of each state and applicable to the child that are considered to be at risk, or that are considered to be at risk for delayed development if it does not provide early intervention services. Risks may be different, stand out biological and environmental factors (i.e. a mother is a drug addict, babies with low birth weight, babies who do not progressing, etc.) (Ramey & Ramey, 1998; Rosenberg, Zhang & Robinson, 2008).

IDEA classifies children into two groups: (I) Child is experiencing a developmental delay, as measured by appropriate diagnostic instruments and procedures, in one or more of the following areas: (1) Cognitive development. (2) Physical development, including vision and hearing. (3) Communication development. (4) Social or emotional development. (5) Adaptive development; or (II) Has a diagnosed physical or mental condition that— (1) Has a high probability of resulting in developmental delay; and (2) Includes conditions such as chromosomal abnormalities; genetic or congenital disorders; sensory impairments; inborn errors of metabolism; disorders reflecting disturbance of the development of the nervous system; congenital infections; severe attachment disorders; and disorders secondary to exposure to toxic substances, including fetal alcohol syndrome (available on: http://idea.ed.gov/).

Strategies and early intervention programs are designed to prevent or mitigate stagnation / developmental delay, or to influence the improvement of development, to maximize the potential of every child and help the family to adapt to new challenges in the home and community.

Table 2 *Areas of development assessment*

Area	Definition	Instrument for assessment
Cognition	Ability receipt, storage and use of information from the environment, solving problems, execution of orders, cause and effect, imitation	BSID II, BDI, HELP, TPBA
Socio emotional	The ability to regulate reactions to other people and in their social environment, temperament, ability to interact, activity level, attention	BSID II, TPBA, BDI, HELP, PEDI
Motor skills	Motor scheme, tone, posture, balance, coordination eye hand grip, grabbing, manipulation	PDMS, BDI, BSID II, Motor evaluation of infants and children
Communication	Expressive and receptive language, sign language	BDI, HELP
Sensory	Reactions to the tactile, vestibular, proprioceptive, visual and audible input	Test of sensory functions of baby, sensory history
Skills for adaptation or self help	Feeding, going to the toilet, dressing, safety	BDI, PEDI

Various authors highlight the importance of using different tools in the assessment of the child (Provost, Heimerl, McClain, Kim, Lopez & Kodituwakku, 2004). The instruments used in the evaluation of the child shall be a reliable and important to be precise in identifying children that includes comprehensive health and social parts, and components related to the behavior and the environment, and that includes members of the family as equal partners in professional team (Lynch, 1998). Instruments for recording quantitative impact measure (i.e. a child has or does not have a certain kind of behavior) do not take into account the quality of the effect (i.e. as the child approached the task). In this paper we present a couple of instruments which are important for special education and rehabilitation, and which have found application in the evaluation in all areas of the child's functioning. One of the most widely applied instruments in programs of early intervention is Denver developmental test which refers to the four development areas: general motor skills, fine motor skills, socialization and language. This test can be used in children aged from 2 weeks to 6 years (Frankenburg et al., 1992). Battelle Developmental Inventory (Newborg, Stock, Wnek et al., 1988), examines the five developmental domains: personal – social, adaptation, mobility, communication and cognition. It is used for children between the ages of 8 months to 6 years. Today, BDI – 2nd edition is in use (Newborg, 2005), and applies to children from birth to seven years and eleven months. Furthermore, for the assessment team in early intervention is in use Bayley Scales of Infant Development, 2nd edition (Bayley, 1993), and the Bayley Scales of Infant Development, 3rd edition (Bayley, 2005) for children aged 1-42 months, then Hawaii Early Learning Profile (Worth, 2004) for children from birth up to three years, i.e. from three to six years of age, Peabody Developmental Motor Scales (Folio, Fewell, 1992) for children from birth up to seven years, Pediatric Evaluation of Disability Inventory (Haley, Coster, Ludlow, Haltiwanger, Andrellos, 1994) for assessment children from six months to seven and a half years, Trans – disciplinary Play – Based Assessment (Linder, 1993), and the like. Some of these instruments are suitable for the assessment of a child based on the game (i.e. TPBA).

Families and support services

The role of the family as an important factor in the process of early intervention points out a number of authors (Joković-Turalija, Pajca, 1999; Klein & Gilkerson, 2000). In the world, the period of the eighties brought the system to accept and support for children with developmental disabilities within their families. Care in the family is based on the principle that a child depends on the mother and other family members to help meet daily care of the child and to make them satisfied; his emotional and physical needs. The birth of a child with special health problems has consequences for the whole family, and their emotional, social and economic status (Shonkoff & Meisels, 1991).

Joković-Turalija, Ivkić, Oberman-Babić (2002), state that the family is the most important in the development of every child because it represents the primary environment in which and from which the child learns. Parents need help and support of different therapists when faced with the knowledge of the existence of difficulties in their child so they can quickly overcome emotional crisis and actively be involved in the rehabilitation process of their child. It is necessary to point out to parents the importance of working with the child in the parental home because it is an essential complement to rehabilitation.

Therefore, early intervention, besides working with a child, also includes working with the family in the form of support and training, through the creation and implementation of the IFSP. After the evaluation (assessment) of a child is finished, and are acquired the conditions for the program of early intervention, family and early intervention team has to develop a written plan for providing early intervention services to a child and its family. This plan is called the Individual Family Service Plan (IFSP), and represents a very important document, and parents are the key members of the team that developed it (McWilliam et al., 1998).

Barton (2013), states that the basic principle of the IFSP that the family is the greatest resource and needs of the young child. The best way to support the children and meet their needs, is to support and build the strengths of their families. The inclusion of other members of the IFSP team, such as doctors, therapists, child development specialists, social workers and others, depends on the needs of the child.

The transition of child from part C in part B of IDEA, starts three months before the child is three years old. Services under Part C are focused on the needs of the whole family, while in Part B services are focused directly on the children. Written document in Part B is the IEP. According to IDEA, the transition from Part C on the Part B requires the creation of a transition plan within the IFSP (available on http://www.agbell.org/Default.aspx?id=768).

IFSP defines the objectives and the types of services that will help the child and his family. Babies and young children with disabilities and developmental delays can get the services that will be provided at home or in the community to assist them in the development in the following areas:

1. Motor skills (reaching, crawling, walking, drawing, building blocks)
2. Cognitive skills (thinking, learning, problem solving)
3. Communication abilities (speaking, listening, understanding others)
4. Self-help and adaptive skills (food, clothing)
5. Social and emotional skills (playing, interacting with others)
6. Sensory processing skills (processing of textures, tastes, sounds, smells) (available on https://www.understood.org/en/learning-attention-issues/treatments approaches/ early- intervention / early-intervention-what-it -is-and-how-it-works).

Families with a baby or a child with disabilities or developmental delays are entitled to 16 services in the context of early intervention carried out by competent personnel under the supervision and approval of the IFSP. Services should be focused on the family, to be inclusive and socially sensitive. The coordinator of services from early intervention program helps parents to make a plan and schedule services. These are the following services: auxiliary aids and services; audiological services; family training, counselling and home visits; health services; medical services only for children with the diagnosis and assessment; care services; nutrition; occupational therapy; physical therapy; psychological services; coordination of services; social work; special classes; speech and language therapy; transport; ophthalmic services (Ramey & Ramey & Lanzi, 2007).

It should be noted that not all services are essential to every child. Most often children need one or two of the above, and it depends primarily on the individual needs of each child and his family.

IFSP should be in written form and contain the following components:

1. Description of current motor, cognitive, communicative, socio – emotional and adaptive development of the baby or a small child that is based on objective criteria.
2. Statement of resources, priorities, and care of parents relating to the improvement of the level of development of the baby or a child.
3. Statement of the major outcomes expected to be achieved with a baby or a small child, and family, as well as the statement of the criteria, procedures and deadlines that are used to determine the level of progress and achievement of outcomes, in order to determine whether are needed the necessary amendments to or revisions outcomes or services.
4. Declaration on the specific early intervention service that is required for the unique needs of each infant or child and family, including the frequency, intensity and methods of providing services.
5. Declaration on the natural environment in which early intervention services will be adequately provided, including justification for the measures, if any, on those services that will not be provided in a natural environment.
6. Planned dates for commencement of services and expected duration of service.
7. Identifying the profession that is relevant to coordinate services for the child or family, and will be responsible for the implementation of the plan and coordination with other agencies and colleagues.
8. Steps to be taken when giving support for the child in the transition to preschool or in another service (available at: http://idea.ed.gov/).

The IFSP is reviewed at least every six months to see if changes need to be made, given the child's growth or changes in developmental status, or given changes in the family's priorities and concerns. The IFSP periodic review may be held more frequently if the family requests it or if conditions warrant it (http://www.parentcenterhub.org/repository/partc-module1/#section1).

Models and approaches in early intervention

Services within the early intervention include the multidisciplinary assessment of children and identifying the needs of each family as specified in the Individualized Family Service Plan (IFSP). Different types of professionals are involved in the work with these children: a pediatrician, child neurologist, physiotherapist, speech therapist, social worker, psychologist, special educator (special education teacher), occupational therapist, ophthalmologist, audiologist, nurse, nutritionist, etc. Providing services in early intervention helps children catch up to their peers and increases the chances for success in school and life in general (Marković & Arsić, 2011).

In 2003 The European Agency for Development in Special Needs Education made a review of the current European situation in terms of early intervention, which as one of the important components quality implementation of early intervention states and teamwork. The Agency stressed that the construction of real teamwork is not easy because it requires multidisciplinary work and cooperation not only with the team members, but also with parents, with the main differences between countries relate to the extent to which education experts involved in the team and with what difficulty meet in order to ensure good coordination and cooperation among experts (available at: https://www.european-agency.org/, European Agency for Development in Special Needs Education, 2005). The members of the expert team for early intervention consists of a psychologist, social worker, early intervention specialists (Early Childhood Educator), a physician and a nurse. The roles of some experts are reflected in the following: a) Psychologist – assessment and evaluation of children's development, psychological and social support, provision of pedagogical guidelines and support, links with social services and resources; b) Social worker – provides social support in the field of information, guidance and solves social risk situations to connect to other professions; c) specialist early intervention (Early Childhood Educator) – early assessment of children's development, monitoring of the recommended program, checking the development program, the association with nurses and daily care; d) A doctor (physician) – assessment of children's development, connection with health care, diagnosis, medical monitoring, referral to specialized health services; e) The nurse – health prevention and protection, information on health issues (Milić-Babić, Franc & Leutar, 2013).

In terms of the way in which the existing teams are organized to fulfil their tasks, it is possible to identify three models:

1. Local and decentralized model, in which provision and coordination of services are regulated by local authorities (municipalities). This model is mainly represented in the Scandinavian countries (Denmark, Norway, Finland, Sweden).
2. Specialist model, which provides and offers children and their families very specialized services of early intervention and centers. They mainly depend on social and health policy, although it is included in the field of education. This model is present in France and Germany.
3. The third model could be called "among service". It is based on agreement and cooperation between different local, regional and even state services. The education system is fully involved in this model, and he is represented in countries such as Portugal (available on https://www.european-agency.org/).

Regardless of which model is represented, seeks to decentralize services. They are centralized only if they are highly specialized. In all these countries, there are laws about early intervention, and composition of teams varies from country to country. When is formed a team for early intervention strictly takes into account the needs of the child and his family, which means that teams are very flexible composition (Marković & Arsić, 2011).

The same authors further state that the expert profiles can be grouped into four main categories that cover specific fields: medical and paramedical (refer to the organic functions and rehabilitation), psychology and education (mental, cognitive and intellectual development), social (aimed at social environment of the child and family). Initially, the medicine has an essential role, because the assessment of the type and degree of damage is given before birth and at birth. In some countries, medicine will later play a leading role in determining treatment and educational work. In most countries, the relationship between the other authorities partnership or individually and each area fully responsible for their work (Marković & Arsić, 2011).

Soriano (1998), emphasizes that early intervention teams have a variety of tasks, which are primarily focused on providing support for the child and then his family. Working with the family is the basic element which includes information, orientation and guidance, support and training. Work with the child is very complex not only in content but also in the way it conducts. Means the provision of assistance and support to the overall development of the child, as well as preventive and educational measures that enable the transition into the education system. The election is for a variety of measures to help and support that provides complete child care. Support can be provided – at home, in day hospitals, the services / centers for early intervention and preschool institutions (day care centers, kindergartens, etc.). Help at home, especially when it comes to children under one year of age, it is common in Denmark, Iceland, Luxembourg, Norway and Sweden. The goal is that home care be the first place in other countries, too.

As in all other areas, and in the field of early intervention is possible to identify three approaches to the same problem. These are multidisciplinary, interdisciplinary and transdisciplinary approach.

In multidisciplinary approach individuals and teams trained in various disciplines focus on a common problem, but with no aspirations toward integrating various theoretical and methodological concepts that are related to this problem (Skinner, 2008). Multidisciplinary efforts are achieved through the cooperation of individuals from various fields who use the tools and concepts from their own disciplines applied to a common problem or topic (Holley, 2009).

Interdisciplinary approach in early intervention involves the interaction of professionals from different disciplines, who are in close relationship with the child and his family, in order to implement early intervention programs. All professionals have direct participation and continuously cooperate with each other to implement the program. Team members conduct assessments independently or together, and establish objectives in cooperation with professionals and parents. With this approach the child and family can receive coordinated services and the ability to leverage the expertise and competence of the team members from several different disciplines. Each member of the interdisciplinary team responds to the whole team, although the degree and extent of involvement may change and vary depending on the needs of a child and the family. The coordinator of services provided to the family is generally the person who is responsible for coordinating the team members, in order to avoid the multiplication of services. In order to ensure the success of this approach, team members must respect the role of other members to develop effective formal and informal communication and to be flexible when giving answers that families require them (Heidegger, 2008).

Moran (2002), states that in the transdisciplinary approach the various disciplines work as a team, including one member performs direct intervention, while other members of the team are consultants. This approach is based on the belief that families can benefit primarily from the intervention of a specialist, rather than more interventions provided by several professional persons. All team members contribute to the evaluation and planning of the program, after which the team implemented a plan in consultation and training of other team members. Transdisciplinary approach allows that each team member can perform functions outside their discipline. The successful functioning of the transdisciplinary team requires commitment and a willingness to overcome traditional boundaries of disciplines and to develop adequate communication and consultation skills. In order to implement this approach, each team member must be fully aware of the development function of children, and to collect sufficient information about the child's family (relationships, material, economic situation, etc.).

These approaches have their advantages and disadvantages when it comes to early intervention. Experts are becoming a team at the moment when they have a common goal, and that is creating support that will enable the child to the best possible development path. What is present in most countries, when it comes to early intervention that a child has more therapists (physical therapist, special education teachers, speech therapists, occupational therapists, occupational therapists ...) and they all treated the child in terms of their profession and science. Sometimes it ignores the fact that all of them affect the neurobiological basis of learning of each child. For this reason it is necessary to establish a correct diagnosis, because it helps the team to focus on assessing the associated problem (motor, cognitive, speech, sensory ...). Next, to determine the level of functioning in all important areas of children's development in order so programs are based on the strengths and have a better effect. Good assessment is the basis for the evaluation of interventions.

INSTEAD OF A CONCLUSION

Based on the analysis of papers dealing with early intervention, we can conclude that the systemic approach developed as a conceptual framework that integrates heterogeneous group of children with developmental risks and difficulties, their families, as well as a wide range of services offered to them and which can be organized in very different ways. In the international context, a great diversity in the field of early intervention contribute to the different national legislative solutions, the tradition of health care, that is, education and etc. System approach recognized the following relevant principles for the organization of early intervention: (a) development approach and focus on the family because it is through empowering parents create optimal conditions for early learning and child's participation; (b) the coherence and coordination at all levels, which includes inter-ministerial coordination because early intervention is provided through health, education and social protection; (c) creating conditions for the greatest possible involvement of how children with disabilities / risk, and their families into the regular programs in the community; (d) early detection and early diagnosis; (e) the system has to have the composition of the monitoring so that children with risk factors or with developmental disabilities could be detected early; (f) all parts of the system provide individualized services; (g) services are evaluated; (h) in order to achieve a partnership with the family to the full extent it is necessary to respect cultural differences and their implications for development; (i) all applied procedures must be based on scientific evidence; (j) to a systemic perspective was held, it is necessary to recognize the interdependence of all factors of early intervention (Guralnick, 2005). The key principle that early intervention in its most modern form differs from the old concept of early intervention is just the first of that principle, i.e. focus on family. This principle implies the creation of a partnership between professionals and parents, recognizing the importance of early interaction between parent and child for the child's development, and the need of empowering parents (Budwig, Užgiris, Wertsch, 2000). It is interesting to note that according to the literature, but also on the basis of law in the Republic of Serbia, parents alert that one of the biggest problems is the lack of harmonization and integration of the system causing a lot of wandering, and a child passes the time (Harbin, McWilliam & Gallagher, 2003; Ljubešić, 2008).

Developmental systematic approach is unique in its order to explain the developmental mechanisms involved in the improvement of children's development in the context of early intervention (Guralnick, 2011). Key development mechanism are three types of early interaction: (a) the quality of the interaction in terms socio – emotional connection with the child and respond to its signals, (b) then that parents create a child experience opportunities, and (c) to take care of his health and safety (Guralnick, 1998). Therefore, a systematic approach recognizes the extreme importance of interactions that take place between the child and parents, and that is scientifically proven to be interconnected during the early childhood development (Landry, Smith, Swank-Lončar & Miller, 2000; Ljubešić, 2001).

The concept of early intervention in the Republic of Serbia has been recognized sporadically, through various legislative and executive acts. However, there is no single law on early intervention, then there is a vagueness of the legislation when it comes to funding the program, and they built the system prerequisites for the implementation of early intervention. Also, there are no reliable data on the number of children with disabilities, age, weight and type of disturbance, social status, etc. For these reasons, we tried to show the system of early intervention, which is already more than 40 years present in the world and thus to give a theoretical and conceptual framework and show the importance of early intervention. The displayed pieces of legislation, adequate definition of children who are eligible for early intervention services, early intervention services, teams and models in early intervention, and the rest can be the basis for developing and improving the system of early intervention in our country. How early intervention is intended primarily for children with disabilities, and they are the target group of special education and rehabilitation, therefore the significance and implications of early intervention for special education and rehabilitation are undeniable and extremely important.

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BRAIN PLASTICITY: DEVELOPMENTAL AND CLINICAL ASPECTS OF IMPORTANCE FOR EARLY INTERVENTION

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SUMMARY

Brain plasticity is not only accommodation of young brain tissue that can change own characteristics, but process that occurs during whole life period, even during old age. Mechanisms of plasticity incorporate: formation of new axon terminals and new synapses, change in neuronal membrane excitability, change in the balance of excitation and inhibition, a long-term potentiation (LTP) or long-term depression (LTD). Molecular mechanisms of brain plasticity encompass neurotrophins, NMDA receptors, the role of calcium ions and calcium channels, free radicals and lipid peroxides. Neuroplasticity also may lead to destabilization of neuronal connections therefore without control of this process plasticity becomes excessive and as a result pathological destabilization and disease may occur. Compensation, which is reorganisation of behavior aimed at minimizing or circumventing a particular disability, is also possible due to process of neuroplasticity. Although, without any doubt, younger and growing brain has greater potential for compensation of damage and higher ability for correction of dysfunctions.

Here we discussed biological potential of brain plasticity and importance of this process for early intervention is special education and rehabilitation. Early intervention will have full effect only if it is applied well-timed, otherwise the effects will be reduced. Accurate early intervention should consider: definition of optimal time period for beginning of early intervention; composition of proper protocols for methods of stimulation and systemic exercise; and application of these measures in connection with prospective biological potentials.

Key words: neural plasticity, brain, rehabilitation, early intervention, motor impairment, cognition

INTRODUCTION

Theory and practice of special education and rehabilitation was under dynamic influence of social changes for last few decades. Therefore, it was mainly focused on solving acute problems of children with impairments and their families. Model of education (special and inclusive education) and content of rehabilitation, as well as systemic measurements, are determined by the state policy. Transitions from one model of education to another model of education bring children with impairments and their families in situations that are often dramatic. Solutions for their problems determined by professionals were therefore often forced.

We believe that changing focus from these measurements towards inner scientific aspects would be much more appropriate. Reflection of biological foundations, as key determinants for early determination, represents reconsideration of connections between methods of special education and rehabilitation and their influence on children with impairments. Validity in acceptation and application of certain methods should be dependent on their influence, not only on magnification of functional capabilities of children with impairments, but also on whole biological development.

Terminological considerations

Brain plasticity is, according to the theory of special education and rehabilitation, state of biological readiness and susceptibility to influences from environment that affects brain. Development in children with impairments is affected and interrupted with some biological factors. They develop on "qualitatively different way" (Vygotsky, 1996). Starting from these facts, from centuries ago, methods of education and rehabilitation were created and oriented towards certain specific impairment in development. As a consequence, methods of education and rehabilitation were developed for children with intellectual impairment; children with motor impairment; children with visual impairment; and children with hearing impairment. Later it became obvious that inclusion of these children in education and rehabilitation as early as possible gives the best results. From this observation term "early intervention" developed in special education and rehabilitation. Early intervention imply: methods, techniques and procedures of stimulation and systematic training whose main goal is to achieve and/or recover specific functions.

Neuroplasticity is defined as capability of neural system that enables functions and structure to be modified according to the requirements of surroundings and inner organism stimuli. Neuroplasticity encompasses changes in structure, especially strengthening of synapses, which further leads to final modifications in function (Porto et al., 2015; Zheng et al., 2014). Brain plasticity is not only accommodation of young brain tissue that can change own characteristics (Krstić, 2008), but process that occurs during whole life period, even during old ages (Porto et al., 2015).

Four major types of plasticity could be observed: adaptive plasticity, impaired plasticity, excessive plasticity, and the 'Achilles heel' of the developing brain (Eriksson et al., 1998). Mechanisms of plasticity incorporate: formation of new axon terminals and new synapses, change in neuronal membrane excitability, change in the balance of excitation and inhibition, a long-term potentiation (LTP) or long-term depression (LTD) (Kulak & Sobaniec, 2004). Neuroplasticity might have positive, but also some negative effects on an individual. Plasticity in axon growth could be observed in prenatal but also in postnatal period as a consequence of brain trauma (Huttenlocher, 2002). Failure in establishment of connection from one neuron to other neuron doesn't have always as a consequence resorption of that neuron. Outcome of this process could be also strengthening of connections to other different neurons. This phenomenon mainly occurs in cells of motor cortex where apoptosis is less expressed comparing to subcortical areas and especially comparing to spinal cord.

Synaptogenesis also occurs according to hierarchical principle. Development of secondary sensor and associative areas depends on development of primary sensor areas, and they depend on sensor input. This way surroundings may affects on brain development as on development of brain functions. Development of one brain area also depends on input from the other cortical area. Number of synapses that one neuron from prefrontal cortex area form is more than tens of thousands (up to 80.000) which confirms complexity of processing information in this part of telencephalon (Huttenlocher, 2002). That is why neuropil has highest thickness in this part of brain. Number of synapses that neurons form in other parts of the brain is lower. In the state of mental retardation dendritic arborization is lower comparing to normal healthy situation. Simulative surroundings induce increase of dendrites number and their size which means that arborization is higher. Balance between excitatory and inhibitory synapses is quite important for dendritic arborization and synaptogenesis. Besides, local conditions and different trophic factors could change purpose and function of certain neuron according to the theory of neuroplasticity. Together with development of synapses, fast development of brain functions occurs. Organized and proper time intervention applied in children with impairments could stimulate development of dendritic arborization and synaptogenesis, which further increase their biological potential.

Molecular mechanisms of brain plasticity encompass neurotrophins, NMDA receptors, the role of calcium ions and calcium channels, free radicals and lipid peroxides.

- *Neurotrophins* belong to a family of secretory proteins that promote neuronal survival and differentiation, but also have essential roles in neuronal survival and synaptic plasticity (Sheng & Kim, 2002). The local and synapse-specific modulation, together with preference in active neurons/synapses, proposes that neurotrophins must mainly regulate active synapses with little or no effect on nearby less active synapses (Thoenen, 1995).
- *NMDA* (N-methyl-D-aspartate) *receptor* and AMPA (a – amino – 3 – hydroxy–5 – methyl – 4 – isoxazole propionate) – type glutamate receptor activation are engaged in synapse formation and stabilization. The NMDA-type glutamate receptor plays a special role in this process because it involves synchronized stimulation by glutamate and membrane depolarization caused by stimulation of adjacent excitatory receptors. Synapses are shaped by the balance of excitatory and inhibitory pathways entering the brain from primary sensory modalities such as hearing, vision and somatosensory sensation, as well as by the activity of intrinsic circuits. These pathways use glutamate as their neurotransmitter. Increased AMPA receptor numbers are also associated with synaptic plasticity (Kulak & Sobaniec, 2004).
- Long-term potentiation (LTP) known as cellular mechanism of learning and memory is defined as a long-term enhancement of synaptic strength resulting from repeated activation of that synapse. In several regions of the brain, LTP has been shown to involve activation of glutamate receptors and calcium influx into the dendrite of the post-synaptic neuron. Facts also suggest that calcium release from endoplasmatic reticulum (ER) stores can promote LTP (Kulak & Sobaniec, 2004).

– *Free radicals (FR) and lipid peroxides (LP)* are the byproducts of cellular metabolism that have been associated with neurodegeneration, however a relation between FR and modulation of synaptic plasticity has been proposed. High concentrations of FR attenuate synaptic transmission and LTP, while superoxide radicals are proposed to be engaged in LTP induction (Knapp & Klann, 2002).

Biological foundation for early intervention could be found at the level of molecular mechanisms. Neutrophines, NMDA and AMPA receptors, free radicals and lipid peroxides are some of the actors in this process.

Discovery of neurogenesis in hypocampus of adult brain at the end of XX century (Eriksson et al., 1998) changed our attitudes concerning neuroplasticity in adults. Before this discovery it was believed that number of neurons that humans get at birth declines during the life period. Today, it is estimated that number of newly formed neurons in adult person per one day is about few thousands. There is hypothesis that newly formed neurons: increase capacity of memorizing, decrease interference between remembered data and add information about the time, but that they also regulate stress situations. It is believed that antidepressants act by increasing hippocampal neurogenesis. Similar effects comes from physical training, learning, changing of environment, ad potentially even health diet. In contrary, stress decrease the number of newly formed neurons, as well as sleep deprivation, through mechanism of glucocorticoid increase. Neurogenesis could improve plasticity of the brain and therefore to regulate our behaviour (Castren, 2005, Павловић, 2012). These data broaden possibility for early intervention in adults and invalid persons. In the case of acquired invalidity that occurred during productive life period, early intervention is applied as early as possible.

"Neuronal recycling" hypothesis (Dehaene et al., 2004) implies to certain limitation of primate brain architecture which is under genetic control with limited variability and plasticity. This means that every cultural object must find own neuronal niche among already existed. The brain adapts to our cultural environment through "recycling" or modifying purpose of already established cortical substrate or its genetic predisposition. Features of our neuronal apparatus (brain architecture) will determine the speed and easiness of cultural learning. Some brain structures for speech are activated through short oral sentences in babies only three months old (Dehaene-Lambertz et al, 2002). This model is compatible with theory of socio-cultural development made by Vygotsky (Vygotsky, 1996) that point to necessity of inclusion of children with developmental impairments in their age groups. Brain plasticity is determined by structure rearrangements and it is present during whole life period (Richardson et Price, 2009). New skills that are adopted induce structural modifications that are present while the skills are used. Influence of speech on brain structures begin very early in life and continue through life. Reading is skill that is adopted consciously; it changes brain structures and demands coordination of different brain areas. Text is recognized as different type of stimulus out other visual stimuli. Importance of speech for development of cognition was previously discussed by Vygotsky (1977) and Piaget (2005). This characteristic of the brain we could consider as capacity of children with impairment to develop while they are under organized influence from environment regardless they are in educational system, social care or health care system. Our

experiences show that absence of stimulation and systematic training in children with impairments and invalid adults leads to behavioural and functional regression as a consequence of probably biological regression.

Developmental aspects of brain plasticity

Developmental impairments in children could be motor impairments and psychological impairments. It is estimated that about 7,9% of children under 18 years old have some impairment that decrease they capabilities. From this number about 29,5% of children have learning difficulties, 6-7% mental retardation, 13,1% impairment of speech, 6,3% some emotional disorders etc (Osmon et al., 2008). Brain development starts during fetal development and continues after birth, but also encompass adolescence. Myelinisation, synaptogenesis, and synapse modification in subcortical grey matter, limbic and prefrontal structures continues till third decade of life (Snyder, 2006). Neuropsychological problems in childhood and adolescence are therefore specific because developmental factors are still persistent. Damage that was introduced early in life does not always show effects immediately because all brain structure are not formed, neither their functions. Therefore, certain dysfunctions are not present until specific period of life. On the other hand, brain plasticity that is specific for development of the child enables under certain conditions compensation of present dysfunctions. Brain plasticity during developmental period enables recovery after injuries based on three mechanisms (Kolb & Whishaw, 2003): 1. reorganization of rest undamaged or less damaged neural circuits which leads to recovery but also to development of disturbed function; 2. creation of new neural circuits in preserved brain structures and in some cortical areas; 3. creation of new neurons and glial cells that exchange damaged brain cells (these cells are produced by stem cell that persist in some brain regions through adult period).

Brain plasticity and motor skills

The cellular mechanisms responsible for neural plasticity in humans are still under dynamic investigation. There are four different mechanisms of motor cortex plasticity. A change in the balance of excitation and inhibition that can happen very quickly is the first one. Second mechanism, that is also quick, is based on strengthening or weakening of existing synapses, in processes such as long-term potentiation or long-term depression. A third process is a change in neuronal membrane excitability, and the fourth, that require most of the time, is anatomical changes.

Two research groups working on motor systems demonstrated that after deafferentation of a limb reorganization of the sensory and motor cortex may occur (Donoghue, 1990; Merzenich et al, 1984). Furthermore, deafferented cortex did not stay idle but was taken over by body representation adjacent to the deafferented body part. Research group of Hallett (Hallett et al., 1999) demonstrated that motor cortex representation of the muscles proximal to the amputation had expanded into the area of the motor representation of amputated part.

Mano et al. (1995), showed that projections from the biceps region of the motor cortex can be directed to the spinal cord neurons of intercostal nerves in patients with brachial plexus avulsion upon the intercostal nerve is anastomosed to the musculocutaneous nerve. What is more, they have demonstrated that the biceps can eventually be controlled separately from respiration, which demonstrates that control of the spinal neurons has been completely altered as a result of the brain plasticity.

Motor function in the limb contralateral to the excised hemisphere experiences a substantial degree of recovery, particularly when surgery is performed at early age. Ipsilateral and contralateral representations in the remaining hemisphere are topographically differentiated; ipsilateral representations have a more anterior and lateral scalp distribution, which suggests that the normal ipsilateral representation has become more influential in these patients and is likely to have contributed to the recovery (Hallett et al, 1999).

It seems that there is a continuous combat for the control of each neuron among its various inputs, therefore the purpose of each neuron or neuron pool will be determined by the dominant inputs resulting from several dynamic processes. For example Hallett et al. (1999) showed that cortical representation for the reading finger in proficient Braille readers is enlarged at the expense of the representation of other fingers. The same investigators also demonstrated the rapid modulation in motor cortical outputs in relation to preceding activity. In addition, theory of cross modal plasticity demonstrated that cortical areas normally reserved for one type of sensor modality that is deprived (i.e. vision) might be activated by other presented sensory modalities (i.e. tactile) (Sadato et al, 1998).

Application of described principles of brain plasticity should be feasible to progress process of spontaneous recovery. For example, use of arm is critical for establishing and maintaining cortical representation of that limb. In physical therapy and early intervention certain balance between accomplishing tasks of daily living and improving functions of injured limb should be established.

Motor activity directly influence sensomotoric representation in the brain as well as senso-motoric pathways that are in direction connection with brain. That is why motor activities lead to establishment of stabile synaptic connections, formation of sensomotoric pathways and enlargement of area of sensomotoric representation. This benefit also stands for children with impairments during their growth and development. It is important to point that organization of motor learning and performance of motor activities are different between certain types of impairment. Does this leads to different effects on brain biology should be further investigated.

Brain plasticity and cognition

Brain development and plasticity could be defined as complementary, but relatively independent processes. Development of normal brain is strictly defined by genetic factors, genes that are expressed in both neurons and glial cell, which are strongly influenced by input from the surroundings of an individual. In the case of insult or injury the system has the capacity to react flexibly, thus circumventing functional deficit.

Out of many cognitive functions it seems that for humans *language* has an essential function. This claim is supported by the fact that under conditions of early brain insult, it is preferentially supported at the expense of other (specifically visuospatial) functions. If there is injury to traditional left hemisphere language areas, homologous areas of the right hemisphere are recruited for language, thus "crowding" out spatial functions that normally would have been mediated by these areas (Teuber, 1974). Alternative to the hypothesis of crowding is the notion of functional redundancy, which proposes that early in development there may be multiple language-specific neural systems. Therefore, if the primary language system is injured or lost, these secondary systems are available to mediate language (Stiles, 2000).

Speech production could be routine, automated, and the one that needs special engagement. Speech also encompass learning and processes of neuronal plasticity, especially during childhood, at the time that vocal apparatus of the child is formed. Vygotsky and Piaget were also discussing importance of speech for cognitive development. It is well known that children with impairments have also problems in speech and language development. The nature of these impairments is different and require specific treatment. Together with development of speech and language, cognitive functions will further develop and enable formation and preservation of social contacts.

Visual stimulation implies stimulation of receptors in the eye; neural pathways; and analytical centres in occipital region of the cortex. If this stimulation is further supported with explanations or instructions then other processes like perception, remembering, thinking etc are activated. Engagement with music has important positive developmental effect on brain functions, especially on language skills (Bidelman & Alain, 2015). There are some indications that these neuroplastic causes have long effect even during old age. It is demonstrated that musical education slowdown decrease of auditory processing in older people. This effect could be observed in phonetic capabilities and more precise cortical responses on speech (Bidelman & Alain, 2015). Musical education affects neural mechanisms of phonetic information processing. This knowledge has consequences on application of intensive early stimulation of the brain. Musicotherapy, therefore could be used in therapy during whole life period, including also in psychogeriatric patients.

Neuroplasticity and developmental impairments

Neuroplasticity during childhood and adolescence

Brain development starts during embryonic development, but continues after birth and during adolescence. Myelinisation, synaptogenesis and modification of synapses in the areas of subcortical grey matter, lymbic system and prefrontal cortex continues until third decade of life period (Snyder, 2006).

Neural processes included in plasticity are neurogenesis, apoptosis and synaptic plasticity dependent on activity. As a result of plasticity children are more capable for adoption of different knowledge and skills comparing to adults (Johnston, 2009). This phenomenon is present during learning of foreign languages, learning to play musical instruments and during motor learning specific for sport skills, as well as during recovery from brain lesions.

During development brain experience affects intensive growth of synapses that later further develop or regress (Johnston, 2009). The choice between wanted and unwanted synapses occurs according to interaction and experience with the surroundings. Early development of synapses is especially intensive in occipital region of the brain. The similar process later occurs in parietal, temporal and frontal region of cortex. This changes correlate with development of behaviour in children.

Dysfunctions of plasticity are quite often in neurological disorders of children (Johnston, 2004). Child's brain is superior in plasticity comparing to the brain of an adult because of more intensive neurogenesis, more effective apoptosis, dendritic arborization and adaptation. Therefore, children and adolescents are capable to learn foreign language without accent and to recover much faster from brain injuries.

Most of the brain structures have neuroplastic potential in early postnatal period. After this critical period, neuroplastic potential decrease. Increased number of stimuli from environment leads to increase in serotonin transmission and increase of number of neurons that produce BDNF. As a consequence the level of neurogenesis in the brain is increased. These processes have important implications on development of brain functions in children with impairments. Also, these processes are important for early treatment in special education and rehabilitation.

Developmental disabilities and brain plasticity

Brain plasticity might be related to several disorders in children: cerebral palsy, epilepsy, hypoxic-ischemic encephalopathy, neurofibromatosis, sclerosis tuberose, phragile x syndrome, developmental types of intellectual disorders, cretinism, Coffin-Lowry syndrome, Rett syndrome.

Children with developmental disabilities have certain potential for brain plasticity that is determined by their biological features. Also, on behavioral and functional level there are some potential for further development.

Down syndrome

Down syndrome is consequence of chromosome 21 triplication, and this is the most frequent type of intellectual disability. Murine model of this syndrome showed decreased number of neurons in cerebellum and hippocampus (Insausti et al., 1998). This model also demonstrated reduced dendrite sprouting and changed anatomy of all neuron extensions (Necchi et al., 2008). Disturbance in neurotrophic factors leads to degeneration of basal telencephalon that is main source of cholinergic innervations of the brain. The same process might be observed in patients with Alzheimer's disease that develops in all Down syndrome patients after they get older than 40 years (Павловић, 2008). Total effect of these processes is preponderance of inhibition in neuronal circuits of temporal area with permanent disturbance of synaptic plasticity (Baroncelli et al., 2011). Potential therapy would be decreasing of brain inhibition.

Autistic spectrum disorders

Autistic spectrum disorder has heterogeneous etiology. Common feature for all forms of autistic spectrum disorder is dysfunction in domain of communication, social interactions, behaviour and sometimes in cognition (Павловић, 2014). Several genetic factors are related to development of autistic spectrum disorder mostly. Mostly they are under control of genes that codes for different subunits of GABA receptors and genes that are responsible for control of maturation of synapses. Personal experience is less important. Dysfunction is present at neural circuits that control social cognition and behaviour, emotion, speech, and thinking (Baroncelli et al., 2011). In large number of patients autism is followed with epilepsy which points on disbalance of glutamatergic excitatory in GABA inhibitory system. Hyperactivity of amigdala was detected with increased and non-effective neuroplasticity. Due to this effect synaptogenesis and fine synaptic adaptation necessary for normal development were affected.

Dyslexia

Dyslexia is relatively frequent specific disorder of learning skills (Павловић, 2014). It was demonstrated that children with dyslexia have pathological variability of sensor and cognitive aspects of hearing (Hornickel et al., 2012). Devices that help in stability of hearing perception improve acoustic attention and clearness of pronounced words. Application of these devices in classroom during one year significantly improved reading skills and phonological discrimination in children with dyslexia.

Cerebral palsy

Cerebral palsy is long life neurological disorder that affects primarily motor functions, usually more from one side (Reid et al., 2015). Physical therapy, occupational therapy, speech and language therapy, along with adaptive equipment, are popular forms of treatment for children with cerebral palsy. Used within a coordinated, comprehensive treatment plan, therapy plays a vital role in managing the physical impairment while optimizing mobility. Critical period for application of therapy are first years of development when brain plasticity has highest capacity (Reid et al., 2015). Neuroimiging might be used for monitoring of therapy.

Cerebral palsy of children has different causes, but they all directs to lesions in brain structures and brain functions (Павловић, 2014). Normal development in these children is not usual because of impossible performance and learning of movements or because of its significant limitation (Lee et al., 2014). Cortical plasticity is absent in the part of the brain that controls movement of dysfunctional extremity, therefore dysfunction further enlarge. New methods of rehabilitation as comprehensive hand repetitive intensive strengthening training system enable encouragement of neuroplasticity in children with spastic hemiplegic form of cerebral palsy in children. Functionality of these methods is demonstrated using functional magnetic resonance. It was also showed that muscles improve in structure and function as a effect of the therapy. The same effects were observed in healthy adolescents that had physical training comparing to the other group of adolescents with sedentary habits (Pareja-

Galeano et al., 2013). In this study different neurotrophic factors were followed: brain-derived neurotrophic factor (BDNF), serum insulin-like growth factor-1 (IGF-1), cAMP response element-binding (CREB) and activation in peripheral blood mononuclear cells – PBMCs. Levels of BDNF and IGF-1 were significantly higher in adolescents on intensive physical training programme comparing to adolescents with sedentary habits. Early learning of skills has positive structural consequences in grey matter of children. The same might be observed in children with cerebral palsy (Johnston, 2009).

Hearing impairment

There are several scientific reports showing that children with hearing impairments demonstrate faster speech development if they were diagnosed and habilitated before they reach 6 months old comparing to other group of children with the same impairments diagnosed and habilitated in later period of life. If child with hearing impairment younger than 6 months starts with the therapy like amplification; voice and speech therapy; and habilitation therapy; then significant improve might be expected. There are several benefits that results from this therapy. Chances for normal development of the child increase and negative effects of late diagnostics like total hearing loss are eliminated. Moreover, chances that child will attend regular school are higher therefore costs of education decrease. Later diagnostic of hearing impairment could have serious consequences on child's development (Finitzo & Diefendorf, 1997; Gopnik, Meltzoff & Kuhl, 1999; Kuhl et al., 1992; Sininger, Doyle & Moore, 1999; Vohr et al., 1998; Watkin, 1996).

Researchers from Garvan Institute of Medical Research from Australia investigated structural changes in auditory cortex at congenitally deaf animal models. They studied effects of early intervention on brain. Upon cochlear implantation performed on these animals it was detected that reestablishment of auditory nerve activity with electric stimulation leads to almost total normalization of previous dysfunctions in auditory cortex. Therefore, reestablishment of auditory nerve function through electric stimulation of cochlear implant recovers cortical changes that are consequences of deafness (Ryugo, 2015).

Colucci (2012), concluded that there are three major types of morphological changes that are results from neuroplasticity. First, synaptogenesis and sprouting are processes that further improve formation on new synapses between neurons. Pruning occurs when stimulus is inhibited. The rule "use it or lose it" here applies not only on function but also on morphological changes of auditory cortex of the brain. Relations between neurons could be reorganized and re-established if there is appropriate stimuli in next few weeks. Second, neuron migration enables adequate rewiring between neurons. This is specialized process that have important role in formation of tonotopic organization of whole auditory system. Finally, there is neurogenesis or formation of new neurons in fetal and early postnatal period. Unfortunately, neurogenesis is not specificity of adult period. Early cochlear implantation enables development of newly formed neurons in auditory system and improves establishment of synapses. For that reason, it is clear that negative effects of sensory deprivation could be avoided and that is main precondition for process of learning and habilitation (Colucci, 2012).

Sensitive period for development of central auditory system is at the time when central auditory pathways have high potential for plasticity. Late auditory evoked potentials P300 demonstrate that children that obtained their cochlear implants up to 3,5 years age old have normal latent period, while children that obtained implants up to 7 years old have abnormal latent period (Scherf et al., 2006). Absence of typical auditory experience brings to serious changes in deeper layers of cortex. Secondary auditory areas could be totally or partially reattached from primary areas and they are not more able to enable cognitive “top-down” modulation. Reattachment of primary and secondary areas could enable to secondary areas to become more accessible to other modalities, i.e. sight (Scherf et al., 2006).

Development of whole auditory system, and especially auditory centres in the brain, is possible only at children with normal hearing. Potential for development of auditory centres decrease with the age of the child and depends on sound stimuli. Upon the first year of life synaptogenesis significantly decrease in auditory centres. Late intervention or late cochlear implantation therefore has no full effect. Children with long time auditory deprivation are succesible to significant reorganization of auditory cortex that is responsible for speech perception. One of the consequences of this reorganization is integration of combined auditory and visual information that could be disturbed upon cochlear implantation.

Visual impairment

Largest part of perception from outside of the body comes through sense of seeing. About 90% of information from outside world we get from this sense and that is why is sense of seeing key factor for physical, spiritual, and intellectual development. Visual cortex of adult person show several manifestation of plasticity, at first place possibility of perceptive learning and adaptation.

Early bilateral sensory deprivation (i.e. congenital cataract) changes structure and function of cortex and late surgical operation of cataract doesn’t recover sightseeing. An early surgical intervention is necessary for normal functional development of sightseeing. Surgical operation should be made latest at 8 weeks of life time, at the time when development of occipital cortex has highest potential. Negative effects of plasticity are lost of vision on strabic eye or at unilateral loss of sight during critical period of development. Although, there are quite good methods for correction of optic anomalies, sense of seeing is in largest part determined with interaction between retina and brain. It is considered that brain plasticity, as well as neural networks, are shaped during sensitive period and stabilized during further normal brain development (Bavelier et al., 2010).

After discovery of so called critical period in early postnatal development, it was considered for long time that all features of cortical neurons from visual cortex are definitive in adult period. Hubel and Wiesel found that balance of information that comes from both eyes could be disturbed with simple closing of the eyes. They detected this effect only in first few months of the life. Experiment was performed on cats of different age, and these authors detected that cats with surgically closed right eye demonstrate significant decrease in number of neurons of striate visual cortex. They observed change in number of neurons only in cats that where between 4 and 8 weeks old, while older and adult cats did not show any effect (Hubel & Wiesel, 1970). Also, different visual stimuli expressed during early childhood, as it is in strabismus or congenital cataract, leads to permanent impairments of vision known as amblyopia (Lewis & Maurer, 2009). These paired stimuli also lead to destruction of typical binocularly organized talamocortical neuron connections (Bavelier et al., 2010). One could ask is amblyopia reversible?

Study of Rahi and his colleagues showed interesting example of incredible plasticity of visual cortex. They demonstrated that in adults with monocular amblyopia lost of sight on "healthy" eye leads to improvement of vision on impaired eye (Rahi et al., 2002). It is assumed that neuron connections in amblyopic eye are preserved but weakened or inhibited, therefore lost of "healthy" eye leads to reactivation of neuron connections (Bavelier et al., 2010). The question that comes from results of the experiment is could we use this phenomenon in clinical practice. The healthy eye could be closed in certain period of time and that might have positive effect on dysfunctional eye. Monocular deprivation is example of neuroplasticity showing that neurons of visual cortex overthrow dominancy on the eye that is opened. Nevertheless, mechanism of this phenomenon is not clear yet. Study of Restani and associates demonstrated that significant role in this phenomenon play neuron connections of corpus callosum. They showed that suppression of callosal connections in rats during monocular deprivation decrease possibility of overthrow of dominancy to opened eye (Restani et al., 2009). This is another proof that plasticity is not phenomenon that is characteristic only for cortex. Significant role in this process is played by neuron synapses.

Early correction is of importance in all types of visual impairments like strabismus, congenital cataract etc. Without early corrections amblyopia occurs because of disturbed development of occipital cortex. Children with higher IQ have higher potential for neuroplasticity with extended time for synapses growth, with initially thicker cortex especially in prefrontal regions (Shaw et al., 2006). What could have negative effect is that child's brain is more sensitive on sensory deprivation comparing to the brain of adults.

Perceptual learning represents one of the main form of neuroplasticity that is defined as improvement in performing tasks after certain experience concerning that task was obtained. In experimental studies perceptual learning of visual system is investigated through different visual functions as: orientation in space; following of movements or geometrical shapes; movement of objects; or through complex functions as recognition of human faces. Bays and associates investigated changes in electric activity of the brain using electroencephalography. They found some alterations in electric activity of alpha waves during activation by stimulus of perceptual visual learning. These alterations show that as a consequence of neuroplasticity not only structural but also functional changes in brain tissue occur (Bays et al., 2015).

Li and associates studied effect of playing video games on inducement of visual system plasticity in adults with ambyopia on one eye. They demonstrated that playing video games in time of 40-80 hours (maximum 2 hours per day) using only dysfunctional eye improves basic visual functions. Improvement was detected in visual acuity for 33%, space attention for 37%, and stereopsy for 54% (Li et al., 2011). Based on this and some other studies many methods were introduced in therapy of shortsightedness as subcutaneous injections of strychnine; application of blinking red and blue light; application of rotating grid; electric stimulation; direct transcranial magnetic stimulation; and pharmacological methods. They are all based on activation of neuroplasticity. Although some of the preliminary results looks promising it is necessary to perform more randomized prospective studies (Li et al., 2011; Maya Vetencourt et al., 2008; Thompson et al., 2008).

Neuroplasticity and neurological disorder in adults

Neurodegenerative disorders

Neuroplasticity also leads to destabilization of neuronal connections and without control of this process plasticity becomes excessive and as a result pathological destabilization and disease may occur (i.e. dystonia). Control of synapses is performed through homeostatic synaptic scaling that stabilize neuronal activity and neuronal network during longer periods of inactivity or hyperactivity.

According to the theory of retrogenesis fibres of gray matter that are last in process of myelinisation are usually first during degeneration as a consequence of aging or disease and this leads to cognitive fall (Brickman et al., 2012). This process was anticipated in XIX century by theory of John Huhlings Jackson about hierarchical dissolution of functions (Павловић, 2012). There are several studies that proofs this theory in model of patients with dementia as well as in model of “normal” aging (Brickman et al., 2012). Measurements of status of grey matter made on magnetic resonance (fractional anisotropy, radial diffusivity) further verify theory of retrogenesis. Physical training showed positive results on neurodegenerative diseases through reduce of degenerative and inflammatory processes (Svensson et al., 2015). The same processes were investigated in Parkinson disease, stroke and dementia. Physical training acts by mechanism of releasing neurotrophic factors, anti-inflammatory cytokines and decrease of pro-inflammatory cytokines. Parkinson disease has effects on motor, emotional and cognitive domain (Павловић, 2008). Programmes of physical training for patients with Parkinson disease include training of motor skills that support cognitive mechanisms of motor learning (Petzinger et al., 2013). Learning is supported by specific instructions that improve movement that were previously performed without conscience. Aerobic exercises sustain blood flow as well as neuroplasticity by increase secretion of neurotrophic factors.

Patients with Alzheimer’s disease showed on magnetic resonance micro-structural alterations of grey matter that are probably consequences of primary and secondary degeneration of cortical neurons (Alves et al., 2015). According to the theory of retrogenesis progression of brain aging and progression of Alzheimer’s disease occur by inverse form in children (Rubial-Álvarez et al., 2013). Aerobic physical training leads to increase in production of neurotrophic factors and this process occurs even in patients with Alzheimer’s disease. Programme of adapted games also showed effective in decrease of agitation in patients that suffer from Alzheimer’s disease (Venturelli et al., 2012).

Traumatic brain injuries

Traumatic brain injuries have as a consequence lost of brain tissue mass, brain cells as well as white matter (Tomaszczyk et al., 2014). These effects decrease brain reserve, accelerate brain aging and induce neurodegeneration. Lack of stimulation from the environment and decreased activity, also have effect on brain aging. These processes leads to negative neuroplasticity.

Brain ischemia

One of the most frequent diseases is brain ischemia or cerebral ischemia. Brain ischemia is leading cause of invalidity in older ages. Beside thrombolysis that is performed in most acute phase of the disease, there is no specific therapy (Felling & Song, 2015). Neuroplasticity occurs upon brain ischemia when different processes like axon growth, synaptogenesis and neurogenesis start. These processes form structural substrate for spontaneous recovery. Neuroprotective mechanisms are important in acute phase but also in the phase of recovery. Their increase is one of the most important tasks of recovery and secondary prevention of cerebral stroke (Павловић, 2012). Epigenetic mechanisms are important in neuroplasticity after brain ischemia (Felling & Song, 2015). Aerobic training is important for stimulation of meuroplasticity after brain ischemia. Intensive physical training of moderate to high intensity acts positive on brain through increased production of brain-derived neurotrophic factor (BDNF), insulin-like growth factor-I (IGF-I), nerve growth factor (NGF) and synaptogenesis (Ploughman et al, 2015). Moderate physical training is more effective for dendritic sprouting.

Recovery from cerebral ischemia is at the beginning of that process faster, then slower and could take even few years. Therapy with hyperbaric oxygen could encourage neuroplasticity in some patients with neurological sequels of cerebral ischemia (Efrati et al, 2013). In one prospective randomized controlled study it was demonstrated that therapy with hyperbaric oxygen has positive effect on neurological functions and quality of life in treated patients.

Aphasia is quite often in cerebral ischemia with mechanical injuries. Acquired aphasia is the cause of trauma on dominant brain hemisphere (Павловић, 2012). Recovery depends on the cause, type of aphasia and brain reserve. Functional neuroimaging enabled monitoring of the active brain and some of the changes that follow neuroplasticity. It was demonstrated that successful recovery from aphasia is under influence of speech and language therapy and depends on improvement of functions in left hemisphere (Marcotte et al., 2013). Rehabilitation is mainly dependant on degree of injury in Broca's area and precentral gyrus. Adaptive brain plasticity is expressed individually.

Anosmia is also present in neurological disorders. Anosmia is dysfunction of sense of smell that is quite often and difficult to treat. Rehabilitation is performed by sensomotoric act of smelling without real smell. Recovery is based on mechanisms of neuroplasticity (Kollndorfer et al., 2014). This mechanism is demonstrated by functional magnetic resonance. Olfactory training induced neuron reorganization.

Neuroplasticity and aging

Aging

As a consequence of physiological aging brain of an older person demonstrate decline of cognitive functions. This phenomenon was thought to be caused by necrotic or apoptotic death of certain number of neurons, at first place in neocortex. Nowadays, it is best explained by loss of synapses and neural connections, but not as a loss of whole neurons (Bishop et al., 2010). From the global prospective an aging brain shows volumetric reduction of both grey and white matter, that is more advanced in anterior than posterior brain regions, reaching a maximum in the prefrontal cortex. Considerable neuronal losses can occur in subcortical centres of an aging brain, but they can be balanced by a volume increase and enhancement of function of the some remaining neurons. Massive neuronal loss is one of main characteristics of progressive neurological disorders such as Alzheimer's dementia. Surprisingly, it seems that cognitive decline in normal aging brain correlates more with reduction of white matter than with that of grey matter. This is due to degeneration of axons and their sheaths, as well as a breakdown of some myelin sheaths with preservation of axons (Berlucchi, 2011).

Therefore, any intellectual and physical stimulation or systematic physical training of older person could contribute to reestablishment of synaptic connections and increase of cognitive functions.

Cognitive reserve

Cognitive reserve is the model that has been build up to explain how it is that some elderly people with widespread neuropathology correlated with dementia show little in the way of cognitive decline. Cognitive reserve is related both to the process of brain plasticity and brain aging. Simply, it describes resistance of the brain to dysfunction. Sometimes cognitive performance is quite below the level supposed for the amount of pathology found, but more often someone with a substantial load of pathology had nonetheless performed cognitively within the normal range. Nevertheless, association cortex, hippocampus and the parts of the brain that these are connected to have been considered as well developed and nourished brain with an abundance of synapses and healthy neurons, which provides structure for cognitive reserve.

However, the relationship between cognitive reserve and its architectural neural basis is not clear. Synapse loss, minicolumn change and total brain size have shown some of the clearest morphological relationships with functional deficits in ageing and dementia (Esiri, 2012). On the other hand, older adults are capable of counteracting age-related neural decline through plastic reorganization on the structural level, such as alterations of dendritic arborisation, synaptic remodelling, axonal sprouting, neurite extension, synaptogenesis, and neurogenesis (Mesulam, 1999). Furthermore, de la Monte suggested that white matter atrophy may precede whole brain atrophy in ageing brains (de la Monte, 1989).

Early intervention and neuroplasticity

Neural plasticity and *cognitive reserve* may play crucial role in the process of recovery and rehabilitation. The accomplishment of the recovery depends on the active participation of individual disabled patients, on their awareness of and insight into their disabilities, and on their attention to the rehabilitating procedures and their motivation to comply with them (Berlucchi, 2011). Brain lesions cause less impairment in individuals with high IQ and advanced education than in individuals with low intelligence and poor education (Wilson, 2003), which could be explained using concept of cognitive reserve. In order to establish reference for the practice of neuropsychological rehabilitation Zangwill affirmed that a strict scientific rationale of rehabilitation is in the understanding of the mechanisms whereby the brain adjusts itself in reaction to injury to its parts (Berlucchi, 2011).

Zangwill distinguished *compensation*, a reorganisation of behaviour aimed at minimizing or circumventing a particular disability, from substitution, the accomplishment of a task by a new method totally different from that naturally employed by the intact brain in the performance of the same task. Substitution was determined as a special form of compensation in which the new method of completing a task is expanded by training over and above what patients can achieve on their own initiative. Today it is accepted that during process of restitution damaged but surviving neurons can re-establish some functional connections due to processes of axonal and dendritic sprouting and synaptogenesis, perhaps akin to those occurring during the developmental growth of the brain (Berlucchi, 2011). Without any doubts, younger and growing brain has a greater potential for compensating for damage and a higher ability for correcting dysfunctions.

Brain plasticity could be affected using specially formed exercises; virtual reality; medicines; transcranial stimulation; somatosensor stimulation. Benzodiazepines and baklofen increase inhibition of cortex (Johnston, 2009).

CONCLUSION REMARKS

Neuroplasticity is natural process that is disturbed in children with impairments and in invalid adults. Studies in medicine and especially in clinical medicine demonstrated that brain has potential to adapt and to perform functional reorganization. Neuroplasticity is feature of central nervous system that is detected in children and in adults, with certain specificity that is consequence of different biological potential. Neuroplasticity is always under huge influent of environment and external stimuli. Therefore, neuroplasticity could have significant role in early intervention in children and adults. We should have in mind that different morphological structure of the brain responsible for motor functions, cognitive functions, vision and hearing demonstrate certain specificity in the process of neuroplasticity.

Medical research in the field of neuroplasticity is further supported with data obtained in experimental work from biological sciences. Processes on cellular, molecular and biochemical level are enabled by stimulation of NMDA and AMPA receptors, neutrophines, free radicals, cytokines etc. They all play significant role in synaptognesis, denedritic sprouting and axon growth that make morphological foundation for establishment of motor and cognitive functions. Increased stimulation from environment leads to increase of number of neurons that produce BDNF which further stimulate neurogenesis in the brain and decrease GABA induced inhibition in cortex.

Early intervention will have full effect in special education and rehabilitation only if it is applied well-timed. In other way the effects will be reduced.

We can define as necessary for correct early intervention: defining optimal time period for beginning of early intervention in children with impairments and invalid adults; composition of protocol for methods of stimulation and systemic exercise; to use these measures in connection with prospective biological potentials.

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BIOLOGICAL, ANTHROPOLOGICAL, AND PSYCHOLOGICAL CONSTRUCTS OF CHILD AND CHILDHOOD

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SUMMARY

This paper presents the results of research of fundamental biological, anthropological and psychological constructs of child and childhood. Dealing with the problem of early development from the evolutional and ethological perspective, the critical analysis of the main elements of ethogram of the child has been done, i.e.very high degree of newborn helplessness and immaturity, nonspecialized development of vital functions, high degree of plasticity of behaviour, and biological system of attachment. In the context of these evidences, the basic constructs of new anthropology of childhood and education, as well as, the new paradigm of sociology of childhood have been presented. In the framework of "social perspective" the child is discover as the active actor of its education and development. In conclusion, the major developmental achievements has been summarized and, by pointing out the following statement: that early childhood is developmental period that has regular flows and universal development in the part that refers to the process of realization of hereditary potential of the individual, while the development of higher mental functions primarily depended on the social and cultural context in which the personality of the child develops.

Key words: early childhood, ethogram of child, animal educandum, anthropology of child, psyhological achievements

INTRODUCTION

Early childhood is a unique, remarkable and very significant stage in life span development of each individual. In just a few years, from a single fertilized cell develops entire organism with all the recognizable physical characteristics (at least in outline) with all the psychosocial characteristics of an adult. Dramatically fast, intensive, and "massive" developmental changes in this period are unrepeatable and totally incomparable with the changes that follow. In early childhood occurs most radical transformation in life: from biologically immature, helpless and totally dependent beings, the child grows into a relatively mature human being, an autonomous member of the community and competent representatives of a given culture.

Developmental changes during early childhood are straight right a small "Copernican revolution"!

Starting from specific dynamics of developmental changes and specific context of development, the most scientist agree that early childhood cover the first three years of life. On the other hand, under the division of mental ontogenesis that rely on strict age (biological) criteria, early childhood is associated only to the second and third year of life, and sets as a development period which follows the period of prenatal development

(development before birth), the newborn period (first postnatal weeks), and the infant period, which covers the first year of life. Finally, with regard to the specific criteria of periodization of psychic ontogenesis within various developmental theories (especiallyof the Russian authors) – early childhood are often "spread" into the ages to school and covers the first six years of the child's life (Šmit, 1991, Kon; 1991; Qvortrup et al., 1994).

Interest in the study of childhood was divided between (or, rather, has been consolidated in the context) of different disciplinary fields: biology, psychology, cultural anthropology, history, sociology. Disparate facts about the characteristics and principles of early child development interact, connect and integrate into a general picture of children and childhood in which they remove and erase strict disciplinary boundaries (Šmit, 1991; Kon, 1991; Matejić Đuričić, 2010).

Biological framework of childhood investigation

Considering the problems of early development from an evolutionary perspective, faced with the fact that progress on the evolutionary scale followed by increasingly longer period of childhood, biologists seek to discover and prove the deep evolutionary sense of prolonged childhood within the more complex species. The conclusion is unique and can be taken as generally accepted view: getting longer period of dependency and more time needed to achieve sexual (reproductive) maturity, do not represent a "luxury" or "random error" of evolution, but on the contrary, one of the necessary and important achievements.

In his "new biology", Adolf Portman, one of the leading biologists of the 20th century, explicitly explains this fact: the man cub is much more helpless and in relation to the total life-span development, more helpless a longer period of time than the offspring of other species; *"a child is born with a physical system to survive, but it is completely unprepared mentally to function as a human being"* (Portmann, 1965:41).

Phenomenon of fetilizationhigh level of immaturity and unfinished specialization of almost all functions at birth, speaks of Portman, follows a new property, built in long-term processes of phylogenesis of homo sapiens*: "high plasticity behavior, and endless opportunities for learning"* (ibid.: 42).

In this sense, although seemingly "unfinished biological", the child is at an advantage compared to the offspring of other animals, because his phylogenesis (development under positive selection pressure) ensures an extended period of learning and development. In short, prolonged childhood is one of the indicators of evolutionary advancement of the human race, because incomplete development in the prenatal period, "open space" for postnatal organism try different options, training and learning and hence, build more complex behaviors and developed a more complex form of adaptation to changing environmental conditions.

Like the tortoise from Aesop's Fables, the child win in the final, after a long and persistent rising!

Ethology, descriptive scientific discipline, which appears on the border of the merger of psychology and biology, and that deals with the behavior of animals (including humans) in natural conditions, has recognized the big evolutionary significance and importance of childhood as a period of extended dependencies, and included this feature in Ethogram of Man (Mussen, 1976; Lorenz, 1970; Morris, 1970). Ethogram of man as the most developed living species including the list of all those distinctive qualities that make it stand out and rise above other species, including his closest evolutionary relatives: anthropoid apes.

In response to the question: What is it that makes a man a man? – ethology states, next, characteristic of the human species, properties: standing upright (release upper extremity conditions are created for the construction and use of weapons); speech (use of language allows the most advanced forms of communication, but also new processes of mediated knowledge); higher forms of intelligence (the ability to providing the highest form of adaptation to changing environments and enables man to overcome the natural limitations and amplifies his powers);high plasticity of behavior (the ability of multiple behavior modification under the action of variable environmental conditions) and biologically determined system of attachment(Matejić Đuričić, 2012).

For ethology, the study of animal behavior and determining ethogram of different living species, is the way to better understanding of the true nature of man.

In the multitude of distinctive properties (the man is an animal that walks upright, thinks and speaks, feels) is one trait stands out: reason or rationality. This property is central in Aristotelian construct of man as *Homo Rationale* and also embedded in the biological classification of species (homo sapiens). In a commentary on Aristotle's description of man as a rational animal (homo rationale) Ernest Cassirer pointed out that this description did valid, but it is not complete and sufficient because the rationality is only a part of something much broader and more fundamental: the ability of forming symbols. Man is the animal symbolicum, being that create and create their symbolic world. Cassirer thus explains his theoretical views:

"Instead of dealing with the things themselves, the man constant twists them in consciousness... Even in practice, the man does not live in the world of irrefutable facts and only in accordance with their immediate needs and desires. In fact, he still lives among imaginary emotions, in hopes and fears, fantasies and dreams" (Cassirer, 1946:25).

The child does not reveal the symbols of the world right now and all of a sudden, but the child has *"certain psychoneurological characteristics, as part of the biological equipment, enabling him to gradually creates the symbolic network, subtle cobweb of human experience"* (Šmit, 1991:72).

Biological theories of language point out that speech is (read: the symbolic function) innate ability specific to the human species (Lennneberg, 1964) providing a series of "biological evidence". All representatives of the human race are some common biological characteristics relevant to the speech: the dominance of the left hemisphere; Maturing speech zone, motor and sensory center are necessary conditions for understanding and production of speech;Regardless of intellectual abilities (except in cases of profound mental retardation) every human being learns to speak; For all children around the same age groups adopt the language and produce speech, and not only to what should be taught, but it would be very difficult to control and prevent the use of their language and speak out; Deaf children spontaneously develop specific (natural) sign language, and children whose parents are deaf, and have preserved hearing itself, easily and quickly acquire language, with minimal exposure to speech and language modelsetc.

The child transformation from biological into social being achieved primarily thanks to the process of language acquisition.This statement will be appeared in a number of psychological and sociological constructs of child and childhood, relying on the biological fact about the nature of man as a being who possesses "collective heritage of the speaking species".

The process by which language and other basic potentionalities of Nature would be realized, has received its special name: the process of humanization, literally becoming a man. In the process of humanization, the child slowly and gradually builds speech and acquire the language, but also all the other characteristics that distinguish man as a special type of mercury: standing upright, multiple forms of intelligence, multiple forms of feelings, and especially important feature: sociability (Man is a zoon politicon, social animal, as Aristotle defined a long time ago.).

In this way, speaking about biological givens of humanbeing, biology is opened up new perspectives for the study, environmental or educational framework in which to realize the child inherited potentialities should be realized.

From biology to anthropology of education

Biological equipment that brings the birth of a baby is not a "given", but "givens", potentionality and "chance" for one of the many lines of development. A child is not born with the status of a man, but toward the status of man, short and very accurately concludes Ashley Montagu, adding that the human *race "prematurely called reasonable animal"*, because the child still in the process of development and education should prove to possess the qualities of man". In this context, the author has noted:

"Biological potentionalities can be developed without environmental impact. This is the case with physical abilities, but even more with the mental capabilities. Developing psychic abilities really possesses infinite possibilities under the action of variable environmental conditions" (Montagu, 1955:85).

The miraculous power of the child, explains further Montagu, is not an achievement, but a promise, a promise that under "secure environment" she or he will develop all the characteristics that distinguish a human being.

Cub monkeys is much more successful than human babies, but the promise of a child exceeds the clearest monkeys (ibid: 87).

The new anthropology of childhood postulates attitude of the child as an *animal educandum,* the being who has to learn and educate in order to develop all the characteristics of the human species (process of humanization) as well as all the individual characteristics that distinguish it as a separate, unique and unrepeatable personality (process of individualization). In the background of this construct is biological understanding of childhood, after which the child exists as immature, incomplete, incomplete, unfinished person, a person in the becoming, and on the other hand, the performance of adults as a responsible, mature, experienced person, ready to assume the role of protector and process controller of child development and education (Qvortrup, 1998). In this way, the processes of education receive a key role in the interpretation of child development. More specifically, in the framework of this approach the rough boundary between development and education has been removed.

In order to develop, the child must learn and educate. On the other hand, education is always incorporates the development progress of the child, and so education becomes a necessary constituent of mental ontogenesis, and child development – essential constituent of education.

Education is seen as a process of constant interaction between the child and the adults who care about him (which emphasized the active, participatory role of the child), and the main purpose and objective of this process is the formation of a mature person who will be trained to take on itself the role of educators.

Ideas about child as an animal educandum developed in the sixties of the last century, the Dutch psychologist Langenfeld (Langefeld, 1956; 1988). Although it is a new language of development and education, many will agree that the basic ideas are not new. Originally, these ideas belong to L. S. Vygotsky, to creator of modern Russian psychology. In the research in the field of development and education Vygotsky ideas are omnipresent, even when the authors belong to different theoretical orientations and are not reported directly to his "fondness" for Vygotsky (Santrock, 2004; Van der Veer & Valsiner, 1991).

For the child, noted Vygotsky, the natural environment is always the social shaped environment. Due to the high degree of vulnerability, social environment is essential for physical and psychosocial child survival, and therefore it is not only the frame, but a source of development for the child.

The key term describing the child's embeddedness in the social environment is the concept of primary sociality. The primary sociality not to be understood as an innate "sociability" of the child, but as an innate need of baby, because of its special position of dependence, from the beginning shall enter into social relationships with other people, and despite the fact that it possess very limited innate mechanisms and means of communication, baby communicates.

"An infant is unable to satisfy any vital need by it self ... most elementary and basic needs can not be met otherwise than with the help of another man ... Path over the other, path over the other man is the main path of child development in this period" (Vigotski, 1996, III: 62).

Construct the child as animal educandum is virtually a copy of the "first paradox of development", in the manner previously defined by Vygotsky. The basic principle of development within this educational framework, somewhat earlier, described Maria Montessori, by the child brief message: "Help me to do it by myself!"

Historically and culturally variable notions about children and childhood

In the perspective of cultural anthropologists, historians and sociologists, who reviewed the significance and importance of childhood in terms of cultural, historical and social development of man, the environment has become the primary focus of interest, however, the research moved from the organism (as individual representatives) to society and culture. Immaturity of children is a biological fact, but the way of understanding immaturity is a cultural thing, it explicates this position La Fontaine (La Fontaine, 1979).

Basic dimensions that change with time and society/culture are: (a) the participation of children in the areas reserved for adults; (b) collective (social) image on child competence, level of autonomy and responsibility of the child; (c) child- adult relations (Matejić Đuričić, 2012).

Diverse research in this area can be summarized in two separate problem circle: the first relates to the study of childhood in historical perspective; another problem relates to the cross-cultural studies contributing to understanding the development and upbringing of the child, depending on the specific social and cultural environment in which children grow up.

Breaking the illusion of a fixed and universal understanding of child and childhood in particular contributed to a classic comparative surveys on the development and socialization of children in the so-called "primitive societies“ (Mead, 1963; Benedikt, 1967; Malinovski, 1971) and research in the field of "ethology of childhood“ conducted by the Russian psychologist and anthropologist Igo Kon (Kon, 1991).

In a excellent discussion of the history of childhood (reviewed the basis of analysis of the available literature of memoirs, teaching literature, paintings and other historical documents.) Philip Aries convincingly demonstrated how the concepts of child and childhood are changeable, flexible (or: relative), and how changes in their use.

*"In medieval society, the experience of childhood did not exist; this does not mean that the children were neglected, rejected or abused. The experience of childhood is not the same as the sympathy for the children. It corresponds the awareness about specificity of the child, awareness about what makes a child different from an adult. Such consciousness did not exist“ (*Aries, 1989: 176).

Until the 17th century, European societies fostered notion of the child as a small copy of the adult man (homunculus) and thus ignored qualitative characteristic of the child in relation to adult and ignored childhood as discreet period in relation to other developmental stages. ”Being a child“ has been simply conceptualized as be dependent person who can not independently take care of himself.

The first evidence for this claim Aries finds in the analysis of paintings child is presented as “a small adult“ without proper anatomical characteristics that distinguish children; kids wear adults clothes and dance “adult“ dance; they have not their own games and toys, but already share them with adults etc. Due to the high mortality of the children, child was seen as a small, fragile creatures, which can disappear at any moment.

Analysis of classical languages also confirms that medieval Europe does not know the concepts of child and childhood in the modern sense of meaning. Linguistic history shows, for example, that the word “childhood” in the English language appears at the end of the 12th century. The rich Latin language possessed the words: *infant* (in the literal sense: he who does not speak), *puerri* (son and the younger servant) and *progenies* (gender, birth, origin, lineage, offspring); these terms are used as labels for the “child”. Nonspecific linguistic roots for the terms “child“ and “childhood“ are also found in the analysis of ancient Greek and Slavic languages.

“The discovery of the child and childhood” (Aries) comes in the period of the industrial revolution, labelled by major social changes and the new division of labor. The critique of industrial society, in which children, also, suffer the burden of hard work, cast a new light on childhood as a particularly sensitive period in the life of man. In this criticism, the Swiss-French ”educator“ Jean Jacques Rousseau, was ahead and was among the first who recognize specific “nature of the child” and the unique world of childhood.

Increasing ”discrepancy between the world of the child and the adult world” (this is the loudest talked by Ruth Benedict) is embedded in the modern collective notion of children and childhood, and this fact most directly illuminates the new position of the child in society.

The “old“ sociological concept of child and childhood A. Milić explains as following:

"In recent history, the children were in the shadow of parents and parenthood, The children were in an inferior social status and dominance of the parents over children was considered as obvious and self-evident fact“ (Milić, 2001:153).

Loyd de Mause (1974) made a subtle analysis of historical change in practice of chilrearings. Following the dimension of the parent-child relationship throughout history, from the tribal community to this day, this author stands out six typical patterns:

Infanticidal: Child sacrifice and infanticide among tribal societies;

Abandoning: Early Middle Ages upbringing practice includes fosterage, outside wet nursing, oblation of children to monasteries and nunneries, and apprenticeship;

Ambivalent: In later Middle Ages “ambivalent” parents tolerated extreme love and hate for the child without the two feelings affecting each other;

Intrusive: Until 18th century, children had to be formally “disciplined”, threatened with hell; use of guilt.

Socializing: In the 19th century, parents began to use of “mental discipline”; teaching children to conform to the adults’ goals, socializing them. Rise of compulsory schooling. The socializing mode is still the main mode of upbringing in the West.

Helping: This pattern is typical for the 20th century. the helping parent tries to assist the child in reaching its own goals rather than socializing him or her into adult goals. Children’s rights movement, deschooling (de Mause, 1974).

Previous findings of historical analysis is fully compatible with the conclusions of contemporary sociologists of childhood. They argue that with the new movement (which begins with a baby boom in the US) *“public and scientific discourse leads to a kind of hypertrophied emphasis childhood and excessive glorification of the child, both at the family level, and the level of overall social evaluation of the position of the child and childhood“* (Milić, 2001: 154).

Another important innovation in the assessment of the changed position of the child in modern society refers to the abandonment of the dimensions of the future as a key variable in explaining the period of childhood. In other words, instead of the projected goals for the future, the scientific focus has shifted to the “current time” and the children’s everyday livings; without adultocentric position and projection, childhood is accessed from the subjective perspective of the child as the main actors of his/her life (Wallon, 1964).

Starting from basic ideas of French sociologists, it is possible to point out the third important change by bringing new discourse childhood. These are the contradictions and tensions that plague the adult-child relationship (Burdije, 2001). Despite strong glorification of child and childhood, in fact, there is a natural asymmetry that divides the world of the child and the adult world (parents). Dichotomised position, generating tensions in this relationship, can be represented through the following divisions:

(a) the superiority of (adult) – inferiority (child);
(б) power –weakness;
(c) maturity –immaturity;
(d) competency – incompetency;
(e) control – freedom;
(f) autonomy – dependency;
(g) responsibility – non-responsibility etc.

The key term describing the "Magic Pass" from the world of the child into the adult world is the concept of socialization. The child is*"immature, irrational, incompetent, asocial, acultural"* and on the other side, *the adult is mature, rational, competent, social and independent individual* – explains Mackey, and adds that new construction of childhood as social fact requires a redefinition of this division (Mackay, 1973:28).

The child actively participates in (its) processes of education and socialization, and the world of a child is a special social reality which should be a separate subject of study. Child's play, peer relations, relations between the sexes, sex and gender differences, schooling and social and academic status of scholars, the position of the child in the family, sibling relations, etc. All this constitutes the corpus of attractive research topics that contribute to a better understanding of new image of childhood (Filipović, 2012).

In a critique of traditional concept of socialization, James and Prout (1994) emphasize the need to be overcome "confusion" between the individual and the person, or a child as a representative species (individuals) and the child as a representative of a culture (person). The new paradigm of sociology of childhood, is built on a new maxim: the child is a social actor, and childhood is a particular part of the social reality!

Psychological constructs of child and childhood

Traditional child psychology were "trapped" by the problems of internal development of the individual at the level of organism, regardless of whether they were explained as a result of learning or maturation.

Organismic model, in other words, focused on internal processes of improvement of the child within the different domains of development (physical, sensory, perceptual, motor, intellectual, language, social-emotional, and moral development). A significant step forward in redefining the basic postulates of the organismic model explanations of the development is done by Piaget with the concepts of cognitive constructivism.

According to Piaget, the child's development is epigenetic, self regulatory process that has its own internal logic, and therefore does not include social learning mechanisms and social mediation and regulation (Piaget, 1972; Ivić, 1993; Matejić Đuričić, 1976; Matejić Đuričić, 1991; Matejić Đuričić & Stojković, 2012). In a critical assessment, Wallon would find a nice metaphor that describes this development asa kind of "Robinsonian development", for a child, like small Robinson, leads a lonely battle with (physical) universe thanks to its own cognitive competence.

Environment, physical and social, have the same importance, and their role is to "aliment" internal development (Piaget, 1972). A parent, teacher or educator needs only to encourage children to develop their self-discovery strategy, for *"...just free exploration and child's independent efforts can produce positive results, both in terms of school success, as well as the general flow of socialization"* (Piaget, 1963: 92).

In Piaget theoretical projection, a child is an active subject, the creator of its internal development (Psychological development) and active participant in the process of its own education (Psycho-social development). More precisely, Piaget "pedagogy" unambiguously states: education is the process of creating designer, inventor and innovator (Piaget, 1963; Satterly, 1987).

Piaget's theoretical model was created in the spirit of strong Cartesian (rationalistic) tradition in psychology, so the majority of critique has been focused on his "pancognitivism", the view that over-emphasizes the role of cognitive factors in global child development. The second part of Criticism comes from the representatives of the "cultural relativism"; they attack Piaget's position of universal and unchanging progression in child's cognitive process, and completely ignoring the social context in which mental development takes place.

Piaget has a ready answer to this critique. In the paper, published under the pretentious title "Piaget's view," Piaget explains that there are two lines of mental ontogenesis, namely: psychological development (internal changing of an individual) and psycho-social development (individual development in specific social context) and both of these views has the same legitimacy in psychology (Piaget, 1972). Piaget decides to deal with internal changes in the child's cognitive advancement, interested primarily in logic, and not in the content of development.

In line with previous division, in developmental psychology there is one more great theoretical system. That is "social constructivism" of Lev Vygotsky, dealing with psycho-social development and formative role of social environment in the process of child development.

Vygotsky rejects all "maturation thesis", according to which the "generative invasions in development" are determined by heredity, while the role of the environment are reduced only to encouraging and accelerating development. At the same time, Vygotsky says a strong deviation from all "empiristic thesis", according to which the social environment is only better or worse framework that provides the conditions (aliments) to the child's individual learning processes.

Vygotsky 's idea of socially mediated development speaks something else and much more significant: social environment has essential formative role in child development. In the short view on Vygotsky's sketches for the theory of "cultural-historical development", it is important to emphasize several key positions:

(a) Highpychic functions of man are historically variable; despite the fact that human biology has not changed significantly in the process of historical phylogenies, psychic life of modern man is qualitatively different from the psychic life of "primitive man";

(b) During ontogenesis, all mental functions appear on the scene twice: first, as interppsychic, then, as intrapsychic category; the origin of child mental development is in social relations;

(c) Construct of primary sociality explains the connection between biology of the child /high degree of helpless) and social environment as the constituent of child development (social mediated development);

(d)Two basic forms of social intercourse between adult-child (affective and cognitive communication) are the operationalization of the construct of social mediation;

(e) The concept of zone of proximal development (ZPD) defines the relationship between development and learning (education) and shows that what a child can do it alone speaks of his development in the "present day", while what the child can do with the help of adults testify about his development in "tomorrow day" (Vigotsky, 1971; 1978; 1996; Ivić, 1993).

Previous analysis shows that the key to Vygotsky pedagogy has contained in the belief that "learning is always tugging development"; in other words, the source of change in the development and upbringing of the child should be sought in the domain of social mediation by the adult (parents and for the child other significant figures).

Fundamental psychological construct of child and childhood, primarily concept of Piaget and Vygotsky, are contained in discussions of periodization of development. In summarizing the debate in this field, Kon indicates the multidimensionality of the concept of development stage, and in this regard suggests "differentiation of different ages" (Kon, 1991). Those are: biological age (calendar age), social age (reached the level of maturity of the child in the exercise of their positions in the world of other people), psychological age (level of general mental advancement of the child) and subjective age self-awareness.In interpreting different line ages, Kon calls for Vygotsky's concept of developmental crisis. Developmental crisis are defined as a specific "point" in development, highlighted the key changes that require new forms of child adjustment (ibid: 27).

First developmental crisis occurs in the newborn period (the transition from intrauterine to extra-uterine environment); second developmental crisis covers the first year of life (walking upright and speakingout); next, it follows a developmental crisis of "three year" (formation of "psychic I" and building new types of social relationships) and the crisis of 7 year which was ending, by formation of social I and self-concept (Vigotski, 1996).

Unlike Piaget, who he general concept of adaptation performed on biological constructs (cognitive adaptation is analogue of organic processes) for Vygotsky adaptation of a child is always a social construct, derived from the social environment and the process of mutual child-adult communication.

CONCLUSION

The foregoing discussion confirms that the concepts of the child, childhood and mental development in a whole, are under pressure of social and historical context. The social context determinate "collective awareness" (dominant social views of the child) that further define the choice of theoretical framework, establishment of the theory of development and education, and, finally, the very concrete plan of empirical research.

Modern research confirms that the timber end of the period of early childhood is marked by numerous and various development achievements, gradually integrated into a unified whole, and despite the different speeds and the pace of progress in certain areas of development, form a unique psychic structure.

How does, in the shortest form, look this development achievements of the child during early childhood?

1. Big physical changes include, above all, a high degree of maturity of the nervous system that controls the full mental and physical development of the child. Regular physical development includes the stable functioning of the physiological systems, and health anatomical development process in regards to differentiation of tissues and organs.Striking and the most visible indicator of physical development (growth) refers to the increase in skeletal muscle mass;in only a few years, body weight of the child is five times higher, while the height been almost tripled. The proportion of the body has changed significantly, and the arrangement of body fat is redistributed, and a six-year old child look like as the “little man”.
2. At the end of early childhood, it has been reached a remarkable level of maturity of the motorzone, which allows the child the practice very complex motor activities and the acquisition of numerous motor skills. On the basis of major developmental changes lies biological process of establishing motor control movements of the body and its parts, which in the first line allows improving locomotion (walking) and apprehension (reaching, and manipulating of object).
3. Along with the process of the rapid motor progression sensory-perceptual capacities of the child, resulting in formation of stable sensorimotor schemes that allow comprehensive perception of reality and its parts. In this sense, motor and perceptual development are inextricably linked with the rapid progression of cognitive during this period.
4. In terms of intellectual functioning, the end of early childhood was marked by the appearance of concrete, objective, conceptual thinking and despite the lack of experience and knowledge, a child in a qualitative sense, approached adult logical thinking.
5. On the level of language development, a six-year child of orderly development, adopted a comprehensive linguistic structure, so, the basic phonological, semantic, syntactic and grammatical features of his speech at all resemble adult speech.
6. The emotional life of six year-old is relatively rich, and the number of experienced and recognized feelings are approaching to emotional capacities adults. Also, in this period, the child for the first time managed to postpone the emotions (in terms of successful regulation of emotional behavior) response, and, above all, control negative emotions such as anger and rage.
7. Due to the domain of social functioning, the child at the end of early childhood reaches the initial (but“enough“) level of autonomy, that in certain circumstances of rejection and isolation from family, would provide an independent survival and relatively successful adaptation in the social world.

8. On the domain of moral development, the child at the end of early childhood child exceeds the threshold of heteronomous morality (judgment based on the external consequences) and took the first steps of an autonomous moral reasoning.

The total development achievements of the child should be linked to three basic characteristics of childhood, such as: Early childhood is the period in which the individual is a long time totally dependent on others (a); This is a period of intensive maturation and varied learning where the child try out different options and gain skills necessary for life in the community of adult members of society (b); Early childhood is a time of preparation for the future, so in that sense, early experiences often leave lasting and indelible traces in the life of every individual (c).

Finally, early childhood is period that has regular flows of development and universal development patterns in the part that refers to the process of realization of hereditary potential of individual, while the development of higher mental functions primarily depends on the social and cultural context in which the personality of the child develops.So, the discrepancy between the world of the child and the adult world still exists.

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EARLY AND CONTINUOUS PREVENTION OF FUNCTION DISORDERS AND LOCOMOTOR SYSTEM DEFORMATIONS DURING THE PERIOD OF GROWTH AND DEVELOPMENT

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SUMMARY

Systematic reviews indicate that deformities of the spinal column are one of the major problem of today's children and a significant problem in the future since it's increase from year to year. During the growth and development, the locomotor system is all the time under the influence of external and internal factors, and as such is subject to deformation. Heritage and bad habits of posture, the load caused by school bags, inadequate working environment, insufficient physical activity leads to disturbed statics of the spinal column, and results with the occurrence of kyphosis, scoliosis and lordosis. The problem of static disorder directly has the influence and makes disorders in dynamics. Physical exercise programs that include strength training and stretching, with the special emphasis on the load of anti-gravitational postural muscles, should help in the prevention of health problems that might arise. Of course, the maximum effect is achieved by activity throughout life.

Complete control of procedures of the kinetic parameters has a very important role in the rehabilitation of children with irregular body posture, as well as in therapeutic methods in general. Measuring instruments which estimate anthropological and functional status of the individual belong to the principles of complete control, with the aim of improving diagnosis, monitoring and determining the effect of rehabilitation treatment.

The subject of our work belongs to the field of biomedical research, and in the narrow sense it treats the issue of body deformities in children of preschool and school age, treatment of the same, and determination of the condition of postural disorders, i.e. status of the spinal column, as well as the possibility of developing and implementing the new program for correction, with a special emphasis on scoliosis. Theme of our work gives the opportunity of application of a new therapeutic programme "scolio-correct" to the correction of spinal deformity.

Key words: proper growth and development, incorrect body posture, scolio-correct therapeutic program

INTRODUCTION

Thousands of years of survival, health and safety of the man is sought and found in the movement and physical activities. During the evolution the physical labour was the main factor in the human development. The first written data on the impact of physical activity on the health, written by Kung Fu, originate from the ancient China of 500 years ago. The first scientific research on the impact of physical activity on health were published at the end of the last century. With the same aim, criteria for the objective dosage of physical activity for health purposes, has been established. A new way of life, a lot of sitting, present in Western countries has a tendency of spreading in developing countries. An increase of chronic degenerative diseases, such as cardiovascular, metabolic, endocrine, locomotor system diseases according to ethiology can be associated with reduced physical activity. In today's modern conditions of mechanization and automatization, lifestyle, conditions and work style, the modern man leaves with reduced physical activity. Less or almost without motor activity increasingly leads to hypokinesia and deformation of the musculoskeletal system.

Hypokinesia is the lack of movement or insufficient amount of physical activity which the body required to maintain necessary level for normal functioning and health. The emergence of hypokinesia leads to somatic changes of the both quantitative and qualitative nature, covers children in characteristic periods of their growth and development, and leaves the first postural disorders that often exceed the fixed deformities. Special attention in the development of children (pre-school and school age) should be given to the development of lower limbs, and in children at puberty focus is on the correct forming of the spinal column, and if a bad posture or deformities are noted, corrective gymnastics, as a special form of kinesitherapy should be applied.

Complete control of procedures of the kinetic parameters has a very important role in the rehabilitation of children with irregular body posture, as well as in therapeutic methods in general. Measuring instruments which estimate anthropological and functional status of the individual belong to the principles of complete control, with the aim of improving diagnosis, monitoring and determining the effect of rehabilitation treatment.

AIM OF THE WORK

The aim of this paper is to describe the mechanisms of the maintaining of proper growth, then upright stance and balance, pointing to the problem of spinal deformity in children developmental age and presentation of a new method, as a complementary method, that can help for better treatment effects.

PROPER GROWTH AND DEVELOPMENT

Into the basis of proper growth and development is the preservation of psychophysical health of the child. The pace of growth and development of children is different. Individual development is not performed correctly and equally in all parts of the body, goes according to the well-established rhythmic process, marked as the so-called periods – crisis of growth (physiological disharmony between growth musculoskeletal system and soft tissue or muscular systems) (Ilanković, 2002). Children show great differences in the level of psycho-physical maturity, if the school work and life tasks are not adapted to their biological maturity, it adversely affects the proper growth and development, which is particularly noticeable and diagnosed in critical stages of growth.

Poor posture most often occurs in next periods: I – the first and the second year of life, in which is an intensive growth and development (body weight, height and psychomotor development in whole). Maturing is manifested in the maturation of tone, reflexes, postural reactions, maturation of motor patterns; II – around the age of 6, there is a transition from preschool to school period which leads to more new activities, more seating, load due to improper wearing of school bags, writing and drawing often in an irregular situation, as well as inadequate beds; III – puberty age from 11 to 14 years, period of intensive secretion of sex glands, increasing of the weight, increasing of physical activity.In this period, some of epiphyseal cartilages of the long bones of the skeleton are being closed; and IV – adolescence period is under the influence of internal and external factors.

I – the first and the second year. From the birth a child is undergoing various stages of development and progress during which constantly improves its motor skills. In the initial period of movement, child is not able to maintain an upright or sitting position. Because of this reason, first move is establishment of the head control, swivelling to the side, pronation, back into the position of supination, and then establishment of the basic form of seating, crawling, and all that for adequate preparation of a muscular corset torso (Flexion-Extension and Abduction-Adduction) for verticalization and proper standing position. Forcing the child for early righting and supporting of upright stance with various walkers often leads to rapid fatigue of muscles and loosening ties, which causes a forced increase in lumbar curvature and increases the kyphotic curvature of the spine (lordosis) which carries the head and the body weight of the upper part. Verticalization of the child is a result of individual biological maturation and ripening of the musculoskeletal system as a whole. A very great importance has state of the metabolism of vitamins and minerals, because this is precisely the period in which the rachitic changes of skeleton occur. Too early load of verticalization adversely affects to the lower limbs and feet, especially in children who already have an innate predisposition to damages and leads to deformities of the lower extremities with direct relation to poor posture.

II – around the age of 6 years. Starting school is a turning point in the child's life, it exceeds the forced stillness and inactivity in the class from the stage of full motion and dynamics (Mandić et al., 1972). Restraint of dynamics, long static loads, educational requirements, decreasing of motor activity, working discipline and psycho-emotional stress changes are something with which school children face every day. Due to inadequate adjustment to these changes morphological and functional disorders of the organism occur (a decrease in body weight, increased restlessness, tension, anxiety, insomnia, loss of appetite, slow growth, etc.), which is known in professional circles as a "school of stress" and results in difficulties in overcoming educational programs and school activities.

III-IV – the time of puberty and period of adolescence is one of the most sensitive phase in the development of child organism in which a rapid growth occurs. In addition to increased hormonal activity and neuro-motor sensibility, this phase marks the rapid growth that leads to overloading of the supporting tissue.

SLEEPING – EFFECT ON GROWTH AND DEVELOPMENT

The development and maturation of locomotor system (bones, joints, muscles) begins intrauterine and intensively continues in age from 1 to 5 years. A lot of factors affect the growth and development of the child in this period. In addition to nutrition, care, motor stimulation, audio and photo stimulation, stimulation of gnostic functions, has particular importance in the establishment of proper rhythm sleep-wakefulness, since during sleep an important process of growth and development of the organism played out, as well as processes of information processing, learning and consolidation of different psychomotor, cognitive and emotional behaviour patterns (Ilanković & Ilanković, 2002).

The recommendation of experts for children aged one to five years is that they should sleep 12 to 15 hours per day. However, obtained data show that preschool children are sleeping less and less.

Based on the latest research of British paediatricians, preschool children do not sleep enough hours a day. It is well known that short sleep can cause mental and physical problems of the child i.e. problems in growth and development. It is also important that the child goes to sleep two to three hours before midnight, because in the early stages of sleep the biggest amount of growth hormone (STH) is secreted, which is a main anabolic hormone that dictate the protein synthesis, and thus the entire growth and development of the organism.

Adolescent who hasn't slept enough and well as a child, can has problems with a lack of concentration, certain cognitive problems, may be less successful in remembering and learning and also prone to depression. In particular, it was noted that these children have a problem in the development of musculoskeletal system, respectively they are more prone to have disorders of static and dynamic posture (Ilanković, 2008).

Older people without enough sleep in childhood, have been showed the tendency towards corpulence, a disorder of metabolism of fat and sugar, high blood pressure, depression and anxiety (Ilanković, 2014). When we talk about proper development and growth of child, and support of the same, in addition to proper nutrition and physical activity, it is equally important to maintain a regular rhythm of sleep-wake in every child. In this sense, the most important thing is always to be in touch with the child's sleep schedule. In this way, it can be noted a positive or negative effect of insufficient or sufficient sleep. The best indicator of whether the child has enough sleep the child's behaviour during the day, and his posture and movement in space. If you have a five-years old child who sleeps nine and a half hours per day, and goes to kindergarten, plays outside and has not be sleepy during the day, then it sleeps enough for 24 hours. However, if your child is often sleepy and irritable during the day, keeps its body relaxed or moving clumsily, it is a sign that it need more sleep during the night or it is in the prodrome of some disease. The growth of the child and the proper development of dynamic and static posture is under control of a proper regime of sleep a child. Each child has an individual need for sleep, which depends on a number of psychological and physical factors, factors of family environment and the environment. Some kids need more than 12 hours of sleep per day, some of them are rested throughout the day and don't need more from nine to ten hours of sleep. New-born sleeps polyphase i.e. sleep a little, a little awake and so throughout the day and night. At the end of the first year sleeping moves to night, and the older infant sleeps at least 2 times during the day.

Table 1 *General guidelines how many hours of sleep is necessary for a child at a certain age*

Age	Night sleep	Daily sleep	The average length of total sleep
2 years	From 10 and a half – 12 and a half hours	From 1 to 3 hours per day (ones a day)	From 11 to 15 and a half hours
3 years	From 10 and a half – 12 and a half hours	From 1 to 3 hours per day (ones a day)	From 11 to 14 hour
4 years	From 10 – 12 hours	From 0 to 2 and a half hour (ones a day or without sleeping)	From 10 to 13 hour
5 years	From 10 – 12 hours	From 0 to 2 and a half hour (ones a day or without sleeping)	From 10 to 12 and a half hour
6 years	From 10 – 11 and a half hour	More often without sleep	From 10 to 11 and a half hour
7 years	From 9 and a half – 11 and a half hours	More often without sleep	From 9 and a half hours – 11 and a half hour
8 years	From 9 and a half – 11 and a half hours	More often without sleep	From 9 and a half hours – 11 and a half hours

NEUROENDOCRINE BASIS OF GROWTH AND DEVELOPMENT

The growth hormone is not released continuously rather in the form of pulses. First it comes to a sudden jump, and then secretion of this hormone in short time intervals falls. The most intensive secretion is in the early hours of the NREM faze of sleep. Therefore, the experiential it is said – 1 hour of sleep before midnight worth more, then two hours after midnight, especially in children and young people. This main anabolic hormone is also a stress hormone, and in the case of stress, injury, pain, cold, hunger, etc. a larger concentration of this hormone is secreted as well. Individual amino acids, especially arginine, brought into diet trough the food, stimulate growth hormone secretion. Hypoglycaemia (low concentration of glucose in the blood) stimulated, and hyperglycaemia (increased glucose concentration in the blood) inhibits release of the somatotropin. Sex hormones stimulate the secretion of growth hormone also.

The secretion of this hormone depends not only on the time of day, as well from the ages. The first few days after birth the secretion of this hormone is very high, and in the next few weeks is reduced. In the period of puberty, the secretion of growth hormone increases again, and the blood values are higher than in adults. After 4 decades releasing and response to this hormone decrease.

Growth hormone does not have a target organ, and exerts effect on nearly all tissues of the body. Plays a role in regulating the growth process (growth in height), as well as the regulation of various metabolic processes (general anabolic effect).

Somatotropin stimulates the growth of cell volume, cell division (mitosis) and the differentiation some of cells, for example. muscle and bone cells. Particularly important is the effect of this hormone on the skeleton. Under the influence of this hormone the production of the protein of bone cells and cartilage cells (chondrocytes) increases, the division of these cells also increases, and the transformation of cartilage cells in the bone cells. Diaphysis of a long bones elongates, and the epiphysis (ends of the bone) moves away one from another. The epiphyseal fractures exist between the epiphysis and diaphysis, contains the cell cartilage, and their division and transformation forms bone cells and bone is lengthening. However, after some time it comes to the exhaustion of the cartilage cells in epiphyseal fracture, and the diaphysis is merged with the epiphysis and the bone growth in length is interrupted. From that moment, bone can only grow in width. Flat bones may grow under the influence of the hormone continuously, so that in the case of increased secretion of this hormone acromegaly are especially expressed for example.

Growth hormone also leads to an increase in protein synthesis in the cells of the organism. It stimulates the transport of amino acids through cell membrane into the cells and increases the concentration of the amino acid, as a substrate for the production of proteins. Somatotropin stimulates the translation of a tRNA (transfer RNA), which leads to increased protein synthesis. Also at the level of nucleus induces the transcription process, and creating even more of informational RNA (mRNA). The process of degradation (catabolism) proteins slows down at the same time.

Growth hormone induces mobilization (released) of fatty acids from adipose tissue and their use as an energy source (lipolytic effect). Converting adipose acids to acetyl coenzyme A (Acetyl-CoA) is increased. Acetyl-coenzyme A may be used for energy and synthesis of ketone bodies. Under the influence of large amounts of growth hormone mobilization of adipose acids and it is so great that liver produces a large amount of ketone bodies, which can cause ketosis.

Somatotropin reduces the use and degradation of glucose. Reduces use of glucose as the main source of energy (at the expense of fat), and encourages the disposal of reserve sugar, glycogen in cells. Increases insulin secretion, but reduces the sensitivity of cells to insulin. Disorder in secretion of somatotropin can cause some forms of diabetes (diabetic effect).

Growth hormone and somatomedin C increase the reabsorption of calcium from the intestine and increases the formation of active forms of vitamin D, which is associated with the stimulation of bone growth.

Growth hormone does not perform (significant) singly its effect, but acts through intermediaries called somatomedins. There are three known somatomedins: somatomedin A, B and C. The most important is somatomedin C, which is called and as insulin-like growth factor (VEGF. Insulin-like growth factor (IGF-I)). Some diseases characterized by dwarfism, the level of somatomedin creation is reduced, also it is deemed that in African pygmies the capability of forming a somatomedin C has been reduced. Somatomedin C is synthesized in the liver under the influence of growth hormone. Otherwise, the growth hormone has a short half-life in the blood (about 20 minutes), while the somatomedin C is active in over 20 hours. Insulin-like growth factor binds to the receptors of these cells, leading to various changes (e.g., activation of tyrosine kinase, thus achieving the effect).

STATIC AND DYNAMIC POSTURE

Motor development of a child present a demonstration of the phylogenetic development of individuals: getting used to the force of gravity and the fight against it, an individual forms a new and more complex patterns of behaviour and orientation in space. The gravity force causes, and therefore is the actuator of the functional and structural changes in the nervous system, muscle and bone-joint system and the entire musculoskeletal system. To get straightened toddler goes through a chronological sequence in motoric development, according to a scheme that fits the phylogenetic development.

The term posture indicates the biological characteristic of human beings through the evolution, and includes the static and dynamic behavior of the body in space and the relation with the environment.

The static posture means keeping certain parts of the body and the whole body compared to the force of gravity. The basic of posture is well coordinated muscle activity of the anti-gravity muscles which allows appropriate projection of centre of body on the surface of the support.

Dynamic posture is any movement in space, refers to the mutual relations of the individual parts of the body and the body as a whole during the movement.

The correct posture causes:

- The correct structure of the skeleton
- Correct musculature (weight, strength, elasticity)
- Symmetry of the body parts
- The state of the CNS and PNS – function of the locomotor apparatus depends on this state.

Factors that affect the posture are:

- Anatomy
- Heritable traits
- Internal factors (state of the skeleton, muscles, skin, neurological status, sensoral function, general health and mental state)
- External factors or influences (bad habits, poor working furniture, poor working clothes, bad bed, professional load restraint of sporting activities, ...).

It is considered that in forming of the correct static posture, the profile of the hull has a natural physiological curvature of the spine, with moderate lordosis in cervical part, kyphosis of thoracic part and lordosis of lumbar part, and the head position with a right view, a slight withdraw of shoulders to back, with chest slightly prominent forward, arms along the body, recessed belly, the extended knees and pelvis under the angle of 60 degrees. The pendulum which is lowered from the middle of the occipital bone passes over the prominent part of thoracic spine to coccygeal part, makes distance in the neck area of about 3 cm, and in the lumbar approximately 4 cm (in women who gave birth to 5 cm). In the lateral projection the imaginary line passes from the middle of the pate across the auricle and the middle part of the shoulders to the lumbar vertebrae, over the hip joint, through the patella, and at the end falls slightly in front of the hock.

Assessment of static posture is done by classical physiotherapy methods: inspection through observation, measurement, and comparison of these data.

The necessary funds for the evaluation of posture i.e. the proper posture:

- Resources for taking planogram (saucer, cotton, ink, paper, pencil, barefoot child)
- Pendulum which changes the vertical axis for measured deviations in posture (spine and extremities)
- Dermograf (pencil to write on the skin that marks some prominent points and facilitates the perception of the asymmetry of body)
- two rulers or bars in length about 75 cm
- Altimeter (measuring height of the body)
- Balances to measure the mobility of the joints
- Centimetre tape
- Carpenter's spirit level
- Inclinometer to measure the slope of the pelvis
- The tri-mirror (for self-observation of posture in multiple projections – forward, backward, semiprofil).

The valuation techniques: patient is barefoot and without clothes, set on a distance of at least 1.5 m, the front and back sides is observed (deviations frontal level), the side (discrepancies in the sagittal plane), checking from head to toe, all deformation and deviations in frontal, sagittal and horizontal planes are registered.

The causes of the posture disorder:

- Disorders of elasticity of the soft tissue
- Disbalance of muscle strength
- Congenital and acquired deformities of musculoskeletal system
- Disorder of growth and development
- Diseases or disorders of the nervous system
- Diseases or conditions that distorts the static posture
- The aging process
- Amputations.

Prevention in the origin of the disorder of posture is a very important by the doctors and parents, so it is necessary to:

- Monitor motoric development of children from birth, every (the smallest and discreet) deviation at any stage, and invest all efforts to prevent the development of deformities
- Provide the expert advice on the wide bandage, walkers, and premature verticalization of children in accordance with the integral-integration method
- Sporting activities, through the game, kindergartens, guidance on different sports
- Wearing of adequate shoes and clothing, and hygiene-dietary regime.

Any deviation from the normal static posture means deformation in terms of the occurrence of spinal deformity in the sagittal plane (lordosis and kyphosis), and in the frontal plane (scoliosis) and deformities of the chest, hip, knee and foot.

Assessment of DYNAMICS posture is done in relation to the assessment of moving in the space. Any movement in the postural attitude, represents a dynamic posture. These movements are related to the reactions of balance and righting. They are presented with automatic movements and reactions of balance. Analysis of dynamic posture is related to gait analysis. Deviations in walking, as well as in other dynamic activities, are disturbances within the dynamic posture.

PROPER POSTURE OF THE BODY

Proper posture means the correct ratios of all body segments, which is a condition for their normal functioning. Most of the authors agree that the proper posture is base, and the health status of the individual depends on it. This should be emphasized when it comes to children, especially preschool and school age – because at that time the development is crucial. Plasticity of the body of children in this age opens up the possibility of numerous, both positive and negative impacts. Negative impacts arise mainly from the sensitivity of the organism on the one hand, and the negative impact of modern lifestyle on the other. All these negative influences can lead to a variety of deformities if reaction of suppression is not on time. Because of this, one of the most important goals of physical education is presenting – the formation of correct posture.

Posture of the body is formed on the basis of the conditional and the unconditional reflexes. The conditional reflexes occur on the basis of the factors from the external environment, and depending on what kind of internal base is encountered (status of active and passive force) and the posture will be same. Active forces are muscles, and a passive are ligaments, bone and joints. Considering that spine presents center of statics and dynamics of the cranial part of the body, and connected to the pelvic bone is tight, it shows that every movement of the pelvis back and forth, increases or decreases the inclination angle, it leads to compensatory changes in the spinal cord. At the beginning those changes can be adaptable, but after a while under the influence of endogenous and exogenous factors it can grow into permanent changes and can undermine both statics and dynamics of locomotor system. The correct posture – anthropological posture is upright position with the arms relaxed beside the body with palms facing forward (Figure 1).

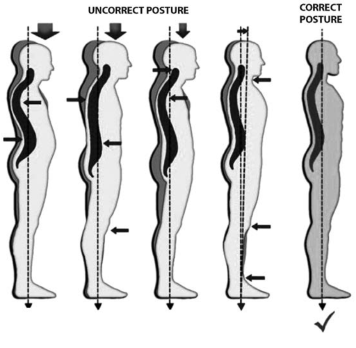


Figure 1 Correct body posture and examples of incorrect posture

The clinical picture of the proper body posture is as follows: the head is in position where the “francfurt” plane is parallel to the substrate (plane defines the lower edge of the orbital pits and the upper edge of the outer ear canal), neck is vertical, shoulders slightly withdraw to backward, the blades nestled at the rear wall of the chest, the chest are slightly prominent forward, the abdomen in the level of the thorax, pelvis is in a position that forms an angle of 60 degrees relative to horizontal, the lower extremities are touching from the inner side, and the feets are between the dorsal and plantar flexion with the angle of 90 degrees in the ankle joint.

A pendulum hangs from the occipital bone, passes over the prominent part of thoracic spine to the coccygeal, makes the distance from the neck 3cm, at lumbar part 4-4,5cm (in women who gave birth up to 5cm). In the lateral projection an imaginary line goes from the top of skull over the auricle and the middle part of shoulder on the part lumbar vertebras, over the hip joint, through the patella, and falling slightly in front of the ankle joint.

Proper body posture also can be seen from the anteroposterior and sagittal posture. If subject of talk is proper posture, then the first thing is that the segments are in balance. Observed from the front side asymmetry of individual body segments can’t exist. In the sagittal plane, all segments must be in plane with the gravity line.

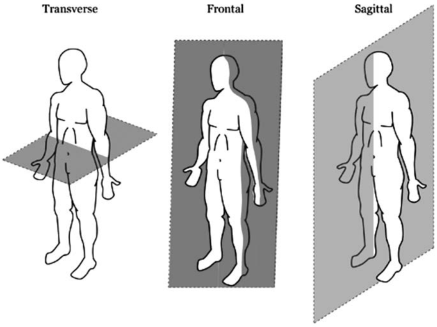


Figure 2 The proper posture shown through three plates of body

Maintaining the vertical position and balance is achieved through a complex action of postural reflexes, which is one of the mechanisms for maintaining a vertical body position. For group of muscles, whose contractions maintain the body balance and position, and oppose to the force of gravity, is said to have a postural function. Postural reflex, which acts on the principle of “feedback”, continuously make a small correction of body posture.

Information from sensory receptors, from the vestibular and visual systems have the key role in this process. As it is known, motor pattern of the body posture is realized through synergistic muscle function. A large amount of information received from the said control mechanisms of body posture allows the successful maintenance of vertical stance i.e. body posture, how towards a variety of limiting factors, so same in the case of complete loss of information from one of the sources. The scheme of the organization of the mechanism of control and regulation of body posture can be reduced on mechanisms from the higher levels (from motoric area of the cerebral cortex), where exists the vision of an ideal physical posture, and on the mechanisms at the level of the spinal cord, where it realizes what can be accepted, cerebellum is taking the role, as the basic system of modulation and central reflex centre, which innervates the descending motor pathways, act on the spinal mechanisms. The muscles that are responsible for the implementation of the postural reflex, are so called postural or antigravity muscles.

INCORRECT BODY POSITION

Incorrect posture can be the cause of various influences that can be divided into endogenous and exogenous. The endogenous factors of poor posture include condition of the skeleton, musculature and skin (myopathy, scars on the musculature and the skin – keloids, DCP, congenital anomalies and amputations); neurological status (innervation disorder, interruption of motor impulses that follow a way the peripheral nerves – paresis, paralysis, disorders of deep sensibility that gives information on the position of vision, hearing, and the vestibular apparatus); psychical states (strong depression with loss of will for activity, mental retardation); general state of health (body temperature, anaemia, respiratory disease, cachexia). Group of exogenous factors includes the poor working furniture (pre-school and school furniture which does not correspond to age), poor bed (high headboard, concave, too soft or hard mattress), bad clothes (narrow shoulders, tight clothes), professional load in footwear, restraint from sports activities.

At children a special role in the making of improper posture can have a disorder of statics and bad habits that children adopt very easy and against which needs to be fight. Research shows that the weight of school bags, improperly carrying of bag, has an influence of the occurrence of irregularities in the body posture of children. It is very important to emphasize that the early detection is the most important element for treatment, and then only a proper follow-up treatment and persistence leads to healing (exercise, the persistence of parents to accompany children and that the exercise becomes an integral part of the day). Improper body posture developed as a result of weakening of the structure of the postural muscles and diagnosed during growth and development, discovered at an early age, can be corrected using kinesiotherapeutic programs and additional sports activities. Sport and all forms of exercise have confirmed the health-prevention impact, so it is very important to direct children early to sport and physical activity as to increase the ability which has a major role in the body's posture.

As a result of some dysfunctional conditions and diseases of some organs, it comes to a slowdown or halt in development in growth. At the problem of irregular bodily posture and deformities of the locomotor system, a decrease in motor skills occurs, and in this sence the most frequently is mentioned strength, endurance, coordination, balance and flexibility.

Posture disorders or deformation of body posture can be divided into four groups: I – deformities of cervix; II – deformities of thorax, III – deformities of the lower extremities and IV – deformities of the spinal column.

TREATMENT OF DISORDER OF STATIC AND DYNAMIC POSTURE

Early detection and prevention of deformities is the main goal in preventing the occurrence of phenomena of spinal deformity due the poor posture. However, if deformity is already diagnosed, then it is necessary to start with a treatment, with the aim to stop progression and if it is possible complete correction. A huge role in the treatment of spinal deformity has kinesiotherapy.

Kinesiotherapy is a form of treatment which is based on the application of the movement for therapeutic purposes. The importance of kinesiotherapy is in the field of prevention, treatment, development and restoring of functions of the locomotor system through the remaining, intact parts, or through restitution, as well through restoration of functions (unused potentials that were not in the function are stimulated and placed into function). Kinesiotherapy is the use of the dosage, carefully selected, and according to the indications and contraindications of the specific movement, that serves to achieve therapeutic goals or rehabilitation tasks. There are two ways to direct, as a therapeutic task – a form of treatment or as rehabilitation, when selected movement is used to achieve the goals set by the team (doctor, special-somatopedist, nurse, physiotherapist, working therapist, social worker, psychologist, educator, teacher, instructor for the professional training, an expert on employment, and if it's necessary, an orthodontist and other technical experts) based on the needs and possibilities of sick person.

Kinesiotherapeutic treatment is directed and dosed in accordance with the objectives and principles of kinesiotherapy, and is guided primarily with the functional status and with integral-integration method. Functional status includes: 1. The biological profile, 2. Functional profile.

The biological profile of the patient usually contains the following elements: body weight, body height, evaluation of breathing (breathing type), vital capacity of the lungs, volume of the chest in three levels, frequency of pulse, balance of blood pressure, body temperature, nutritional status, skin colour and turgor of skin, and the sensitivity level to pain.

Functional profile of a patient, consists of:

- Basic elements (which contains each functional status)
  a - volume of motion in joints where we expect problem
  b - evaluation of mobility in the adjacent joints
  c - evaluation of muscle strength: manual testing (0-5), with dynamometer (kg) for the upper limbs and for lower limbs with scale, persistence (measured by the size of work per unit time kg / min), speed of execution of movements, maximum contraction RM (through 10 movements or 1 movement with a certain load), measuring the length of limbs, measuring volume of limb, evaluation of coordination (through concrete actions and coordination tests), evaluation of sensitivity (insensitivity, sensitivity, hypersensitivity).
- Specific elements (depending on the area and the types of health problems).

Programme kinesiotherapy for the deformation of the spinal column in the sagittal and the frontal plane must contain:

- Auto-correction exercises before in front of three side mirror
- Auto-correction exercises of the posture using a triple mirror, Exercises of balance,
- Group of exercises for stretching shortened musculature
- Group exercises to strengthen weakened musculature, Exercise for endurance,
- Consultation for a certain type of breathing and target sports activities.

The general treatment of kinesitherapy of scoliosis with curvature between 10-20 degrees:

- Auto-correction exercises in front the three side mirror
- Exercises of balance and equilibrium (VILAN)

- Exercises of stretching shortened musculature (pelvi-femoralis, hamstrings, m.iliopsoas, m.triceps surae, m.quadratusa lumborum)
- Exercises to strengthen weaken and stretched musculature, and abdominal muscles and spine extensors
- Exercise endurance of the torso extensor, Exercises of breathing and relaxation
- Hydro-kinesitherapeutic treatment,
- Sports activities.

Kinesitherapeutic treatment of spinal deformity includes programme of the patients with corset. To the group of under the armpit corset belongs SENO and TLSO. A characteristic of those corsets is not to exceed the level under the armpit, so they are not used in the treatment of high thoracic and cervical curvature whose centre above Th7 vertebra. The use of those corsets is great progress in non-operative treatment of idiopathic scoliosis with appropriate kinesitherapeutical exercise programme. Production of a corset uses various plastic materials (ortoplast, polycarbonate, prenyl, polypropylene). The ideal corset would be one that would prevent and control unwanted movements, and in the same time facilitate physiological and desired movements. Corset sets up to people whose curvature exceeds 20 degrees measured according to Cobb. Kinesitherapeutical exercise programme, in patients where is already indicate this type of corset, is performed up of two parts, and the patient performs them on a daily basis: the first part of the program – exercise without the corset; the second part of the program – exercises with corset for 30 minutes.

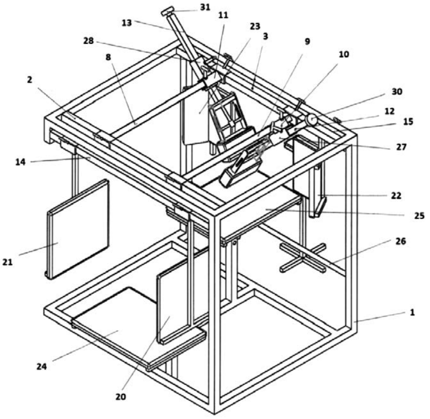
EDF GIPS corset is a corset which is also used for the correction of scoliosis. It unites three corrective forces which are opposing to the forces acting: elongation, derotation, flexion of the spine to the side towards of convexity of the curve. The aim of the gypsum corset is to reduce deformity and reducing of the curvature. Spondilodenesis – surgical treatment of spinal deformity is indicated when the angle of curvature is over 45 degrees and the cardio-respiratory function is compromised, and the goal is to stop further progression, correction of deformities of the hull, the reduction of spinal curvature. The procedure consists of stiffness of the scoliotic part of the spine. In preparation for surgery is used a halotraction – a metal ring placed on the head under the anaesthetic, at the level where is the largest head circumference, a minimum of 1 cm above the tops of the ears. Load is 2.5-3 kg.

Kinesitherapeutical program for these patients is intended to make good preoperative preparation, and after surgery, the patient is already in intensive care and begins with breathing exercises, active exercises for the feet, and with static contractions m.quadricepsa.

Kinesitherapeutical program of preparation for the surgery involves stretching pelvico-femural muscles, breathing exercises, muscle strength of the hull extensor. Final exercises after surgery include – strengthening of the muscle corset and extensor of troops.

SCOLIOCORRECT – new method and therapeutic programme

SCOLIOCORRECT is a new therapy (therapeutic programme) which supports active and passive 3D correction of spinal deformities.

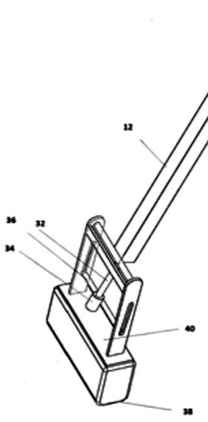


1. Support frame of the device
2. Sliders for transverse positioning
3. Sliders for longitudinal positioning
4. Connectors between pedal and sliders for longitudinal positioning
5. Pedal mount
6. Hip fixator mount
7. Shoulder fixator mount
8. Hip fixator
9. Shoulder fixator
10. Knee support
11. Torso support
12. Pedal mount fixator
13. Wheels for fine force adjustment and angular adjustment of pedal

Picture 3 Drawing of the device for biomechanical correction of spinal deformities

Passive correction is based on the use of device for biomechanical correction of spinal deformities which consist of: unit for controlled correction in horizontal plane. This treatment is individual and it is performing by two therapists in controlled environment, according to specially created protocol for this therapy. Therapy starts to apply, by placing patient in prone position in the device. Then, two pedals of device are placed on paravertebral musculature of the most prominent part of the deformity curvature from left and right side. These pedals act in opposite direction.

With the device, therapists suppress deformity of the spine toward axial axis of the spinal column by moving pedal mount and wheel for fine force adjustment. In this way Cobb angle is reduce. Movement of pedal mount has visually controlled by therapists and amount of applied force depends on therapists which he determined by his experience. When desired amount of force is reached, everything is fixed.



1. Shaft which is used for fine force adjustment
2. Nut
3. Slider which allow transfer of force from shaft to pedal
4. Pedal
5. Pedal mount

Picture 4 Pedal mount with pedal

Tolerance to pressure, also called “pain threshold”, which does not exceed in the therapy, is marked as the score 6. Patient in this position with applied force stays between

10 and 45 minutes. Basically this biomechanical correction of spinal deformities is type of acting on components for passive stabilization of spine, which is precondition for muscle activity.

Project requirements

Amount of applied force and time of treatment only depends of therapists and patients personal feeling (pain threshold). These personal feelings cannot be used in any research. For these reasons it became necessary to define right amount of applied force. Project requirements are:

Using axial movement of pedal mount, pedal is set to desired position. With this movement of pedal some amount of force is applied on patient. It is necessary to measure intensity of force which is applying on patient spine.

When is pedal fixed on desired place, therapist starts to perform fine-tune of force intensity by rotating wheels. With rotation of wheels pedal start to move horizontally in the direction of patient spine. In this way pedal force is applied on patient spine.

Examining current state of the device it can be conclude that during design pay any attention about automation of device.

Main disadvantages of device:

All sliding connections are made with big clearance, which is result of using standard square tubes without any fillings. This results in hard and complicated pedal positioning.

All part of device is fastening with M10 standard screws. Contact surface between screws and square tube are too small which results in loose connections between device pats. Some screws are not placed on right position, which can produce additional stress on device construction.

Pedal is made of wood covered by sponge and leather. Wooden part of pedal is not made very well which make sensor positioning more difficult, also this affect measurement accuracy. Relationship between pedal mounts axis, pedals and contact surface is variable. Only in special cases these axes are coincident. These problems result in inaccuracy of force measurements and calculations of tangent and perpendicular components of force in plane which is located on contact surface between pedal and patient body.

After analysis project requirements, following tasks are defined:

- Selection of sensor
- Production of electronics for signal conditioning.
- Designing digital device for acquisition, processing, numerical and graphical presentation of measurements.
- Programming device
- Adoption of technical solutions for:
- Housing
- Connections between digital device parts
- Installation of sensors
- Testing
- Testing results with observed defects
- Protocols for defects removal.

Analysis and selection of technical solutions for the force sensor

Analysis and selection of technical solutions for sensors are based on the following parameters:

- sensors / sensors of pressure and the force available on the market,
- Design of device for biomechanical correction of spinal deformity.

As it was decided that the sensors should be installed in pedal, their choice is drastically narrowed because for such implementation it is necessary to used thin sensors.

Overall, two types of sensors were analysed: matrix sensor and ultra-thin force sensors. Based on the analysis and project parameters it was decided that FlexiForce force sensors will be used, the manufacturer Tekscan, USA, type A401. This type of sensor is characterized by flexibility, can be used to measure force between almost every kind of surface and is very robust. Character of the sensor is resistive, i.e. under the force, resistance of the sensor will be changed in the way that the resistance will decrease if the intensity of a force is larger. They can be used to measure both static and dynamic loads a large range, up to 450 kilograms.

Physical characteristics of the selected sensor:

- The thickness of 0.208 mm
- The total length of 56.8 mm
- Width 31.8 mm
- Sensitive Surface 25.4 mm in diameter
- The connector is a two-pole, male, with a gap of 2.54 mm
- Sensitive area is circular with a diameter of 25.4 mm

Figure 5 FlexiForce resistive force sensor, model A401 (manufacturer Tekscan, USA)

Overall sensitive surface of the sensor is treated as a single contact surface, therefore application of load should be distributed evenly across the entire surface of the active sensors to ensure the accuracy and repeatability of measurement readings. By changing the way, the load, response of sensors is changed, which affects the accuracy. If the load is concentrated on a smaller area of the active surface, then it needs to be positioned closer to the canter, never on the edges of the sensor as this may cause damage to it. Otherwise, if the load is spread over a wider area than it is necessary, sensitive puck should be used. Puck is a piece of solid material, smaller than the dimensions of the sensitive area, and is used with the aim to concentrate total load to the contact surface of the puck and sensors. Considering that the selected sensor detects only forces that are normal on the sensitive surface, the tangential force cannot be read and may lead to its damage.

Calibration of the sensor is a method of connecting an electrical output of sensor, i.e. more correctly, voltage on sensor using certain physical size – the intensity of the force. In order to perform calibration, it is necessary to load sensor with known force and to record the resulting value of the sensor output. The procedure is repeated with a certain number of known loads that should be in accordance with the scope of the force to be measured, and complete examination defines the transmission characteristics.

The accuracy of measurement affects a great number of characteristics: repeatability (same answer every time when is induced in the same way), linearity (the sensor response to an applied load is in the domain of changes of initiative); hysteresis (if it is under the influence of constant force, constant resistance will decrease), temperature sensitivity (requires calibration at the same temperature at which it will be used) and the life of the sensors (depends on the application, the solutions adopted for the installation and usage).

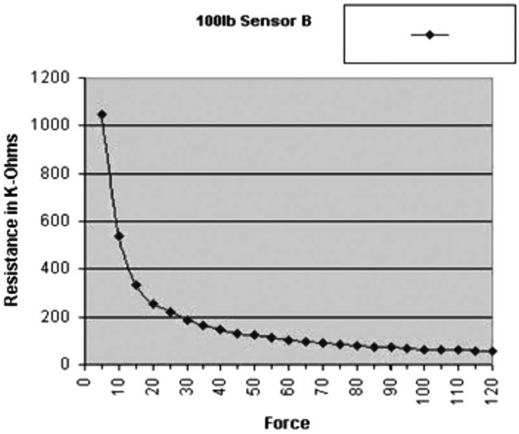


Figure 6 Transmission characteristics of the sensor A401 [22] Pounds [lb]=0.4535 [kg]

Electronic circuit for signal preparation

The most common way to use an electronic circuit in order to convert the force is conversion into a voltage signal. Electronic circuit is based on the operating amplifier whose input is brought the signal from sensor. Pretermission a signal through such a circuit a voltage signal is obtained, that is ready to guide the circuit for analogue-to-digital conversion on whose outlet would be obtained a digital signal suitable for further processing.

An example is presented in Figure 7, in case of using multiple parallel sensors. The sensitivity of the circuit can be adjusted by changing the resistance in the feedback, or through the application of the supply voltage. Lower values than mentioned reduce the sensitivity of these sensors and simultaneously increase the maximum force that can be measured. The effect of changes in resistance is shown in the graph in Figure 8.

The requested information is the resultant of forces, i.e. the total force. Solid surface – Al plate, is implemented and mounted between the sensor and the contact surface with the role of ensuring the equitable distribution of the total load on the four installed sensors. The maximum force that the sensor can measure, or the operating range of sensor can be adjusted in two ways: by changing the resistance in the feedback, or changing the supply voltage of the sensor.

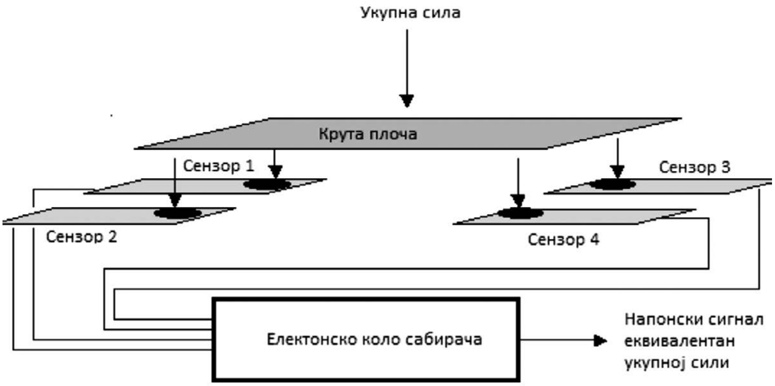


Figure 7 Schematic representation of mechanical solutions for concentrating forces

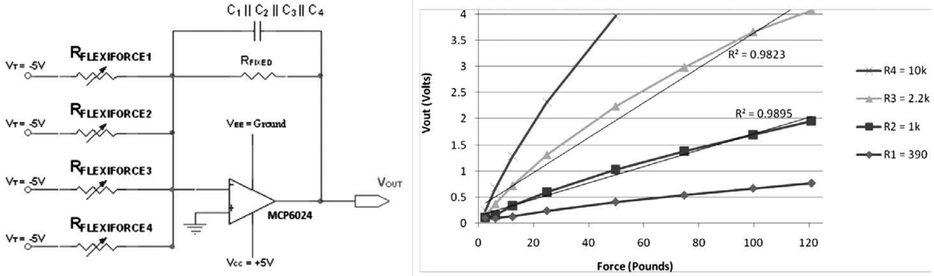


Figure 8 The electronic circuit for signal preparation

Do the values for the equivalent resistance is occurred by measuring the resistance of each sensor, built-in pedal, without load, and using the calculations of the parallel connection of the same.

The design of digital device

The design of digital devices for acquisition of completed measurements, their visual display and store information for further analysis consists of several stages:

1. select a digital electronic device for processing of the measured signal that can also be used for visual presentation of the measured values. Visual monitoring is essential to control and ensure that the treatment is carried out exactly according to the prescribed procedure,
2. The design of graphical user interface, interface (GUI),
3. programming.

The realization of the project assignment is based on the finished digital device, mikromedia Plus for PIC32MX7, manufacturer MikroElektronika, Serbia.

Figure 9 Electronic device for measurement, acquisition, numerical and graphical display of measured values, the appearance of the front side

Selected digital electronic device for measuring, acquisition, numerical and graphical display of measured values has integrated a number of options, so at first glance it can be said that it is oversized. This solution is chosen to ensure conditions for further improvement.

SOFTWARE SOLUTION

In realization of software solution, everything starts with perceive of needs and from the point of view that usage of the device should be easy so that the maximum "depth" is a single screen. Options of electronic devices for measurement, acquisition, numerical and graphical display of the measured values are from the importance to the implementation of solutions;

- TFT touchscreen display, 256K colours screen diagonal 4.3 ", resolution of 480x272 pixels,
- USB communication,
- microSD card.

Figure 10 Main screen for navigation through the programme

After the device is turn on, the main screen is activated, and is used to navigate through the implemented modules. List of module is presented in the form of buttons. Activation of a module is done by pressing the field defined with the single button. The order of buttons in the list corresponds to the procedure that should be done in each of the measurements.

System parameters that can be set using a module are:

- sampling time t [sec] – defines how often measured values are stored in the output file and plotted on graphs,
- cycle time tc [min] – defines the duration of the cycle, usually changes because it depends on prescribed therapy,
- force of threshold of pain FPB [N] – defines the force that is set through test and given in order to use this parameter in a module for measuring.

The parameters that are set internally, through programme, and whose values the operator can only see but can't change, are:

- force of saturation Fsat [ADC] – the maximum power that can be measured,
- counter of measurement BM – parameter that defines the total number of measurements until the current moment. With every completed measuring the value of the counter is automatically increased by one.

*Време узорковања ts[sec] =
*Трајање циклуса tc[min] =
*Сила прага бола Fpb[N] =
• Сила засићења Fsat[N]=1000
• Бројач мерења BM=1000

Figure 11 Screen of the module for adjustment

Next in line is the calibration module. This module is need to activate before each measurement, because of annulment force on the pedals in order to provide as much as possible accurate measurements.

Fl [ADC](t_0)=
Fd [ADC](t_0)=
○ нуловање
ПРЕНОСНА КАРАКТЕРИСТИКА
○ лева
○ десна
m1[kg]= 10 ADC1=
m2[kg]= 20 ADC2=
m3[kg]= 30 ADC3=
m4[kg]= 40 ADC4=
m5[kg]= 50 ADC5=

Figure 12 Screen of the module for calibration

Resetting the force on the pedal, when they are not in operation mode but in the zero position, shall be:

- selecting the option "annulling"
- activation of the option "read"
- activation of the option "calibrate"

Improperly done "annulling" and the definition of the transmission characteristics of the pedals, in the module calibration, directly affects the accuracy of the measured values.

As one of the control points that calibration is done correctly is numeric value of the force that is displayed in the module to measure when the pedals are in zero, non-active position. This value should be zero, in the above mentioned conditions.

After activating the module for measuring immediately conducts the test values of force on the pedal and gives a numerical value display on the top of the screen. The initial graphic display is not active, as well the countdown the time cycle.

By activating the option “start”:

- activates the cycle, starts the countdown of the time of cycle, which is visually shown with the green line at the top of the screen. The width of the screen in this case represents the duration of the cycle, so that it can allow a visual overview of how much of the cycle has been passed and how much it remains. This option is given because cycles can last up to 45 minutes.
- activation of the graphical view of changes force, it is assumed that the measured force on the left pedal displayed in the left half of the screen in blue, and the measured force on the right pedal on the right half of the screen in yellow.
- activation of the recording of the measured values.

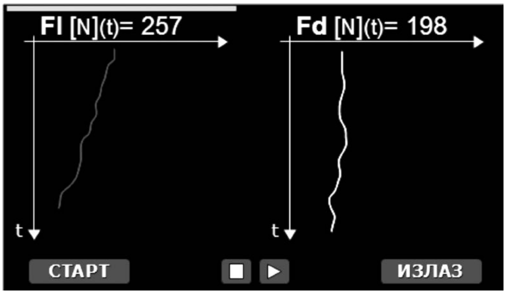


Figure 13 Screen of the module for measuring, a force Fl (left) and force Fd (right)

CSV file represents a text file, but formatted in a way that is recognizable to the programmes for spreadsheet calculations, so that it can easily be opened for further processing.

The final look of the kit for the acquisition, processing, numerical and graphical display of measurement values

The final appearance of the kit for the acquisition, processing, numerical and graphical display of measurement values is presented in Figure 14. Until the final decision came after an initial adaptation of solutions in areas that have been proved as impractical and unreliable during the first commissioning device in work. The kit is built into the device for biomechanical correction of spinal deformities.

Figure 14 Final look of the set for acquisition, processing, numerical and graphical display of measurement values

PILOT STUDY – RESULTS

The initial research included ten respondents. Recorded measurements are represented in the chart. In Figure 15, method of the data sampling and files recording per patient on the left, can be seen. The graph shows the strength of the pressing force of the left and right pedal and its oscillation during the treatment.

```
"Merenje BM","Vreme uzorkovanja ts[sec]","Vreme trajanja ciklusa tc[min]"
000001,1,45
,,
,,
"Vreme","Fl","Fd"
1,21,44
2,36,78
3,38,74
4,28,69
5,31,74
6,42,81
7,34,85
8,47,98
9,39,90
10,40,92
11,40,81
12,47,87
.......
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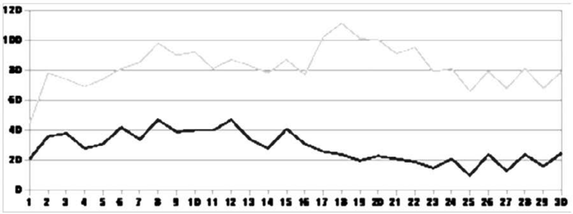

Figure 15 Appearance of the CSV file, the effects of the forces Fl and Fd

Adopted schema of file is as follows: the first two rows represent the header, in the first place is the name of the field from a header, and in the second their value. In the header are the parameters of cycle defined through the module settings.

It should be noted that further monitoring and work with the same patients is in procedure, in order to get the real impact of SCOLIOCORRECT – these new methods and therapeutic programme.

CONCLUSION

1. The main objective of this work is the application of SCOLIOCORRECT – new method and therapeutic program for the correction of spinal deformity, with the special emphasis on the treatment of scoliosis in order to improve treatment and improve the achieved results. The need for the mentioned device is shown through the functional reviews, analysis of the effects of application of the current methods and techniques and the comparison of results one to each other.

2. Adaptible solutions have proven to be satisfactory. The maximum results are achieved from the aspect of availability of solutions, defined budget for the first phase of the project and the design of the device.

3. Measurement project, acquisition and analysis of pressure force as the main parameter of the program makes its contribution to the success of the program. From one stage to the next, and to the final realization of the method which will have a scientific contribution, and device for itself that will give new, better chance to reduce deformity and improve the quality of life to patients.

4. During the selection of solutions for the practical realization of the project, great attention was dedicated to the possibilities of further improving of the electronic device for measurement, acquisition, numerical and graphical display of measurement value, so and for the device for biomechanical correction of spinal deformities.

5. Significant improvements in the construction will be reflected in redesigning of the entire device with an emphasis on the automation of all the moving elements. In that case, a fully automated device is obtained and the control would be fully electronically, using a computer and / or microcontroller.

6. It is necessary to emphasise that further research is needed in this field and the practical application of the device in medical centres, on as many subjects, in order to confirm the effectiveness of the methods and to allow the introduction of the device in clinical practice.

7. It is very important to mention that only early detection of deviations, from the correct body posture, is a guarantee for success. Incorrect body posture caused by the weakened structure of the postural muscles that are identified after birth, during growth and development, especially those that are discovered at birth or early in life, can be corrected with additional programs of physical exercise and using the program “scoliocorrect”.

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ROLE OF EARLY INTERVENTION IN ACQUISITION OF PRE-READING SKILLS OF CHILDREN WITH VISUAL IMPAIRMENT

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SUMMARY

Emergent literacy consists of the skills, knowledge, and attitudes toward literacy, that are developmental precursors to reading and writing. We could consider emergent literacy a foundation of literacy, or set of pre-reading skills, that a child gains from birth until formal instruction in reading and writing. Pre-reading skills represent the basic knowledge about literacy, which includes general knowledge and concepts, language skills and perceptual-motor skills. Typically developed children learn these skills naturally, during the childhood, from birth until the beginning of formal instruction in reading and writing, at home and from the environment.

Children with visual impairment (both blind and low vision) cannot attain pre-reading skills without instruction. Visual impairment limits a child's incidental learning and decreases opportunities for gaining access to experiences. Infants and toddlers with visual impairments require lots of interactions and early life experience that supports their oral language development, perceptual-motor development, awareness of print or Braille and opportunities to explore writing.

Pre-reading activities for visually impaired children need to be organized within early intervention. Professional support and structured activities play a key role in facilitating interactions of visually impaired children with the environment and directly providing them with different experiences. The support must be directed towards gaining meaningful language, literacy concepts and perceptual-motor skills that directly enable acquisition of literacy, either print or Braille.

Early structured intervention and a team approach, with the aim of supporting pre-reading activities, can be important predictor of successful reading competence of blind or low vision child later in the school.

Key words: pre-reading skills, children with visual impairment, early literacy, role of early intervention

INTRODUCTION

Reading intervention aiming improve academic outcomes of visually impaired children has been of considerable interest to educators and researchers the last few years. From a developmental perspective, early precursors have a particular value in understanding how early interventions can provide the foundation for future success in literacy. Literacy development is much broader than reading and writing, and can be supported with a wide range of activities.

Children start to learn language from the day they are born. As they grow, their language skills become more complex. They learn to use language to communicate with others, and to express their ideas, thoughts and feelings. During this process, children learn skills that are important to the development of literacy. This developmental process, whereby children acquire the foundation for reading and writing, is known as emergent literacy. Whitehurst and Lonigan (1998), propose that emergent literacy consists of two sets of skills and processes. The first domain refers to children's knowledge of the contexts (i.e., the meanings of words, concepts about the world, how narratives are structured) in which reading and writing exist. This domain consist knowledge about the conventions of print, emergent reading (pretending to read), narrative knowledge and language (vocabulary). The second domain refers to children's understanding of the rules (i.e., that letters form words, that letters represent sounds, that punctuation marks carry meaning) of translating print into sounds or sounds into print. This domain consists of alphabetic knowledge, letter-sound knowledge, emergent writing (pretending to write) and phonological awareness (metalinguistic skills). Other important factors include short-term memory for phonologically coded information, rapid naming (ability to quickly say aloud a list of letters, numbers, or colours), and interest in reading and writing. Emergent literacy is influenced by environmental factors, or the contexts of children's lives, like socio-economic status of the family or education and parental vocabulary. Whitehurst and Lonigan (1998), emphasize the importance of the home literacy environment, particularly language development, conventions and intentionality of print, and print motivation.

Early interventionists should carefully consider impact of visual impairment on skills and knowledge under domain of emergent literacy and develop strategies and interventions to facilitate pre-reading skills for blind and low vision children. Through the support of parents, caregivers, and educators, a blind or child with low vision can successfully progress from emergent to conventional reading. But, emergent literacy instruction is most beneficial when it begins early in life of child, because difficulties are persistent and often affect children's overall development. Focus need to be on the development of the six key components of pre-reading skills:

- oral language (listening comprehension and vocabulary development in particular)
- phonological awareness
- concept development
- knowledge of the conventions of print/braille and print/braille intentionality
- alphabetic knowledge
- rich literacy environments.

Reaching a certain level of literacy for blind and low vision children is a unique and long process.To facilitate emergent literacy and pre-reading skills in children with visual impairments, early interventionists should provide collaborative, family-centered support that is developmentally appropriate and evidence-based practices, that result in development pre-reading skills before they starting to formal instruction of reading and writing.

The role of early experiences in acquisition of literacy

From the birth, babies are actively learning through the predictability of visual, auditory, and social-emotional experiences with parents or other caregivers (Ramey & Ramey, 2004). During childhood, children spontaneously acquire general knowledge about the world that surrounds them, simply by observing. They learn names of objects, phenomena and living beings which they encounter daily, and gain a rich vocabulary based on many experiences with actions and objects. Around the age of four, children will start to know the relation between verbal speech and written symbols, and become aware of writing as a mean of communication between people. During this period children gain basic knowledge about reading (direction from left to right, titles etc.). They become aware of phonological segments of speech and learn about grapheme-phoneme correspondence (Kolić Vehovec, 2013).

Unlike typically developed babies, infants with visual impairment have difficulties gathering and interpreting information surrounding them. During early childhood, blind infants cannot understand emotions, they do not respond to stimulae with social smile and they are not interested in behavior of people. Toddlers with visual impairment are limited in experience, and spontaneously gaining knowledge is difficult. The consequencesof such behaviourare insufficient practical and general knowledge and lack of developmental acquisition of concepts. Due to low level of basic knowledge and skills, children with visual impairment are more likely to lack school readiness and have problems in acquiring academic knowledge. Providing visually impaired children with effective learning opportunities in important areas of literacy, starting form the early stage of development, could prevent school failure and improve academic achievement later on (Ramey & Ramey, 2004).

Role of perceptive and motor skills in the acquisition of literacy

Perception skills are actively involved in processes of locating, selecting, extracting, analyzing, recalling and manipulating relevant information from the environment. Visual, auditory and tactile perception provides basic knowledge and gives opportunities to children to learn about their environment. During this process, visual perception plays a major role.

Visual perception is a foundation of cognitive and motor activities and it enables realization of great number of different task, also literacy tasks. If we consider literacy task, we could highlight that visual perceptual skills are essential for matching shapes, patterns, letters and finally, words, and enable spatial perception, shape discrimination and discrimination of abstract symbols which is the prerequisite for reading (Garzia et al., 2000; Dibek, 2012). Visual memory (ability to recognize or recall previously presented visual stimuli) is responsible for maintaining the mental image of an observed image and remembering the shapes of letters and the order of words in a sentence (Garzia et al., 2000). We could conclude that visual perceptual skills are the core skills for literacy acquisition, respectively letter and number recognition and development mathematical concepts (Barraga & Morris, 1980; Clutten, 2009).

The reading of children no matter is it blind, low vision or typically developed is characterized by the same physiological, psychological and linguistic foundation. The main difference between those readers is in perceptive canal through which they receive information form a text. Low vision children, like typically developed peers using visual perceptive skills to decoding the symbols (letters, words and sentences). Given the fact that blind children are unable to learn through visual input, the tactile-kinesthetic skills are of essential importance. It is necessary for these children to develop tactile skills, and learn how to understand and discriminate tactile images. For blind children, tactile skills resemble a prerequisite for reading. Tactile skills enable to decoding information from the Braille text.

Beside perceptive skills, for literacy acquisition, physiological maturity and integration between visual perception and fine motor control are necessary.Visual-motor integration refers to the coordination of visual perception and fine motor output. Writing means that a c child must be able to copy the observed shape. For presenting shapes on paper, is necessary to posses proper visual perception skills, psychomotor skills and hand-eye coordination. Visual perception and fine motor skills play a major role in development of pre-writing skills (Dibek, 2012). Small muscle development, eye-hand coordination, manipulation, dominant hand use, proper posture and pencil grip and the ability to copy the shapes are all prerequisites for handwriting. In the process of writing, visuo-motor skills, motor planning, manipulation, and kinesthetic awareness all play a major role (Marr et al., 2001).

Areas of early literacy

Early literacy should be considered a continuum of behaviors, skills, processes, and concepts about written and oral language that precede the development of conventional literacy skills (Sulzby et al., 1993; according to: Erickson & Hatton, 2007). The conceptual framework of early literacy, suggested that emergent literacy is comprised of these important constructs: oral language, metalinguistic skills and basic literacy knowledge (Senechal et al., 2001). These skills and knowledge have a different role in gaining the skills of reading and writing.

The role of oral language development

Learning to read strongly relates to children’s oral language development. Oral language skills have been accepted as a critical construct in emergent literacy. These skills include receptive and expressive vocabulary, comprehension and semantic, conceptual and narrative knowledge. Research has suggested that the processes, skills and knowledge that all fall under the construct of *oral language* are the best predictors of later success in literacy (Senechal et al., 2001, Erickson & Hatton, 2007; Ramey & Ramey, 2004). Children who are in arich and highly interactive language environment until age of six, acquire strong oral-language skills like: correct pronunciation of all the sounds of their native language, rich vocabulary and know the meaning of a lot of words and concepts. Such children have the ability to understand dincreasingly complex spoken language and can express themselves through the use of specific words in conversation aldiscourse (Ramey &Ramey, 2004; Bierman et al., 2008). By developing oral language, a child acquires metalinguistic skills, phonological and syntactic awareness and basic literacy knowledge (conceptual knowledge, function of print, alphabetic knowledge, emergent reading, letter-sound knowledge, etc.) (Erickson & Hatton, 2007).

Role of basic literacy knowledge

Children gain knowledge about reading in the preschool years (Ramey & Ramey, 2004). They learn that:

- Words are made up of sets of distinct sounds;
- Printed word corresponds to the spoken word in orderly ways;
- Letters and combinations of letters relate to sounds and meaning, which in turn help them decipher words on a page;
- Words combine into sentences and have sequences that are important to telling a story or conveying useful information;
- Before the formal education of literacy begins, children need to be familiar with the concept of books. During preschool, due to being in contact with the print, typically developed children learn how to handle books – holding them the right way, turning the pages in sequence, exploring the pictures, and know that the words tell a story.

Factors interfering with the acquisition of pre-reading skills of visually impaired children

Early life experiences provide a foundation for overall learning, in school and beyond and gaining them is an essential basis for the development of literacy. For typically developed children, early experiences provide very important incidental learning. For those children, little or none active involvement from parents or other adults is needed.

Critical components of early literacy of children with visual impairments do not differ markedly from those of their sighted peers. However, the way visually impaired children gain early experiences does. They need intervention and support from adults and professionals. Unfortunately, visually impaired children are not usually provided with accessible ways of support in the area of early literacy. They need a lot of effort and structured activities with parents, teachers and other caregivers. The development of meaningful concepts has received much-deserved attention in the early education of students with visual impairments. Short description of most common problems visually impaired children encounter that directly influence gaining of pre-reading skills follows.

General knowledge and experience. Due to limited visual perception children with visual impairment do not have access to a lot of information surrounding them. General opportunities to explore the world naturally are decreased when compared to typically developed peers. Visual impairment limits not only a childs incidental learning, but opportunities for gaining access to experiences. For children with visual impairments, incidental learning through casual observation may be restricted or impossible. Concepts that young fully sighted children acquire without direct instruction are generally taught to students with visual impairments (Koenig & Farrenkopf, 1997).

Knowledge about concept of print. Compared to children of typical development, children with visual impairments lack incidental access to print. They have limited incidental learning through pictures, television or text in the environment, and they are less exposed to reading storybooks and engaging in other literary learning experiences (Koenig & Farrenkopf, 1997). Children with visual impairment do not know the point and importance of exchanging written information in regular daily activities. Many low vision or blind children may not have been exposed to print or Braille before they reached kindergarten or even preschool (Hatton et al., 2010). The main reason for that is because a child with low vision encounters inadequate print size with its first attempt at reading during childhood. A child quickly becomes fatigued and loses interest and motivation for reading activities. It is even worse with bind children since they cannot spontaneously encounter Braille letter. This behavior leads to most visually impaired children not knowing any letters in preschool (Barlow-Brown & Connelly, 2002; according to: Hatton et al., 2010), while most typically developed children can recognize approximately 15 print letters (Treiman & Rodriguez 1999; according to: Hatton et al., 2010). Delay in determining appropriate reading medium, or lack of real life experience, may result in difficult acquisition of basic literacy knowledge (Erickson & Hatton 2007; Koenig & Farrenkopf, 1997).

Language and metalinguistic factors. For many children with visual impairment (both blind and partially sighted) language and concept development are delayed (Erickson & Hatton, 2007; Erickson et al., 2007; Bishop, 1991).

Language development can be misleading for visually impaired children. Initially (in pre-verbal and at the beginning verbal stages), visually impaired infants show little delays, and are generally able to imitate words and syntax. They begin to exhibit delays when language begins to have meaning (Bishop, 1991).

Delays in using language. Visually impaired and especially blind children have a tendency to use words that are not based on sensory experience. They have difficulty conceptualizing the meaning to objects or actions they cannot observe. Sometimes, a visually impaired child is able to use many words and proper syntax but has no idea what he/she is talking about (Bishop, 1991; Craig, 1996).

Phonological awareness is a critical skill because it's associated with the ability to recognize letters. As we already pointed out that visually impaired children often do not know the letters, and their phonological awareness is not at an adequate level by the time they enrol in school (Hatton et al., 2010).

Motor and perceptive factors. Children with visual impairment, especially blind, have delays in motor development. More precisely, the motor development of children with visual impairments may occur in a less harmonious way.

Research indicates that a 5 month old blind infant has significant developmental delays in its ability to employ its hands functionally: hands will be fisted, held at shoulder height, without engaging them at the midline. Infants and toddlers with blindness must progress from initially responding positively to touch, to reaching out and exploring the environment through touch (Bouchard & Tetreault, 2000; Erickson et al., 2007).Usually, the incentive for tactile exploration is supported by visual dimensions: color, pattern, shape, location, but these dimensions are unavailable to a blind infant. For blind infant, without support, purposeful tactile activity is minimal. Delays in early stage of development will result in delayed gross and fine motor development, later in the childhood.

Delays in motor development of low vision children are also reported. Researchers have noted that preschoolers with low vision have problems with psychomotor activities, including hand-eye coordination, bilateral coordination, and motor planning.

They are frequently unable to perform many motor activities through sheer imitation, and they are usually more careful when traversing through space than their sighted peers (Bouchard & Tetreault, 2000).

Poor perceptive development along with motor difficulties can hinder learning how to write. Researchers have found a statistically meaningful relationship between writing problems and problems with visual perception, motor coordination and visual-motor integration skills (Dibek, 2012). Visual impairment and blindness generally negatively influence development of fine motor and object manipulation skills and often lack hand strength (Ferrell et al., 1990; according to: Erickson et al., 2007).

Role of early intervention in preventing readingdifficulties of visual impaired children

Infants and toddlers with visual impairments require lots of interactions and early life experience, that support their oral language development, perceptual development, awareness of print or Braille and opportunities to explore writing (Erickson & Hatton 2007; Koenig & Farrenkopf, 1997). For visually impaired children, parents and teachers play a key role in directly providing to different early experiences. For those children, professional support and activities in the family are key factors for acquisition of literacy (Steinman et al., 2006).

For a visually impaired child it is necessary to organize activities which aim to support the gaining of general knowledge, development of meaningful language and development of motor and perceptual skills. Suitable activities are reading aloud to the child, developing book concepts, encouraging early reading and writing (e.g., pretend reading, scribbling); expand child's experiential base and general concepts; developing fine motor skills, etc.

1. *The first component of the foundations of literacy of visual impairment children is experience.* Experience enables gaining rich knowledge about the world surrounding us. Children with visual impairments need adults to facilitate their interactions with the environment. Visually impaired students need direct, hands on practice with basic concepts (such as size, shape, position, time, classification), as well as, direct exposure to common everyday life activities. Research indicates that the importance of a rich base of concrete experiences provides meaning to reading and writing and becomes an essential foundation for the development of literacy for students with visual impairments (Koenig & Farrenkopf, 1997). Firsthand experiences are important in many ways. Concrete activities are those that help a child understand abstract concepts in a manner that makes sense (Brennan et al., 2009). Concrete experiences, early in life, build a conceptual foundation of meaningful language, and add an extra dimension in the context of literacy: meaning of the stories (Bishop, 1991). For meaningful reading the child must be able to relate situations portrayed in stories to its previous experiences. The same principle applies to writing (Hall & Rodabaugh, 1979; according to: Koenig & Farrenkopf, 1997).

The way children with visual impairments gain this repertoire of experiences differs from that of fully sighted children. Alan Koenig and Carol Farrenkopf (1997) identified global areas of experience as essential to learning and understanding specific concepts. They recommend activities like doing or making things (crafts, cleaning up), experiences with friends, family and living beings, experiences in the community and home with books, etc. The global experiences in these areas would be gained by engaging in typical daily activities. But for understanding specific concepts (time concepts, sensations, colors, position, size, body parts, actions, counting, measurement), experiences would be dependent largely on instruction, usually in preschool programs (Brennan et al., 2009).

2. *The second component of the foundations of literacy is acquisition of language and literacy concepts.* For understanding the language and introduction to literacy, children must learn the meanings of words. During this process, adults (parents, caregivers) have a key part. Common activity for developing language abilities of children is reading the stories. Reading aloud to children is an important activity for expansion of their language. It offers children enjoyable experiences with books, and they learn book-related concepts, such as reading left to right, turning pages, and understanding that print conveys a message (Brennan et al., 2009). Most sighted children have had exposure to books before their first birthday. By the time they enter school many literary concepts are familiar to them. They enjoy stories and books read by others, using pictures to add to enjoyment, pretending to read from books and playing with paper and pencil, becoming familiar with letters and symbols and understanding that letters make sounds and sounds make words. These experiences are the core foundation of literacy. Child does not perceive printed words as units in text bound by spaces. In order to read simple texts, a child must break down his produced speech into word units; locate the visual (tactile) patterns in text; move in the correct direction; and coordinate the timing of his looking with his uttering (Clay, 1991; according to Morris et al., 2003). However, children with visual impairment, especially blind, miss many of these important concepts.

Visually impaired children need systematic help (a detailed verbal explanation and obviously experience) in order to learn concrete meaning of specific words and concepts. A common problem is that reading aloud by adults, for children with visual impairment, is unfortunately not so common activity. Parents of these children often find it difficult to know what and how to read to them. Since this activity is often greatly enhanced by looking at pictures in books, visual impairment may inhibit a child's engagement in this activity. Children with visual impairments do not often "look at books" because the pictures within do not have meaning to them. In turn, this is likely to frustrate the parent. In this case, professional support is necessary. Without support, parents may not attempt to encourage a child with a visual impairment to explore books (Brennan et al., 2009).

In order for a child with visual impairment to enjoy a book as typically developed children do, adequate picture books and children's books are needed. Books for children with visual impairment must have two mediums: print (for a person that reads) and Braille (for blind children). When reading, the child's attention should be directed towards examining tactile images and Braille letters. Therefore, different types of preschool Braille books exist.

Braille book. In these books, the print letters are placed exactly above the corresponding Braille letter.

A print book with Braille added. Clear plastic sheets with Braille text, can be inserted between print pages or stuck to print pages.

For small children it is recommended to make “basket books” with real objects and textures inside (objects, textures, sound tapes, sound effect buttons and real sounds, etc.), enhancing the story.

Tactile-visual storybooks assist adults in providing the experiences that form the foundation of literacy for visually impaired children. This way, visually impaired children gain basic knowledge about the written form of communication before starting school.

3. *The next important component of the foundation of literacy is writing activity.* Early intervention should include motor development that relates directly to reading and writing skills in later childhood (Erickson et al., 2007). Children with visual impairment, like other children, should be encouraged to do prewriting activities, like drawing and scribbling. But for these activities they need to have proper materials. Children with low vision, similarly to sighted peers may use pencils, paper, crayons, and markers for visual representations of their ideas. Just as children who use paper and pencil, blind children should use slate and stylus, braillewriter or plastic foil to create tactile representations for drawing and scribbling (Brennan et al., 2009). Craig (1996) found that these tools and activities are usually not provided to blind children. Parents may not realize the connection of Braille-related writing activities to literacy, or may believe that it takes specialized knowledge to assist a child in using them. Without support from professionals, parents may not attempt encouraging a blind child to “write“ or identify Braille letters (Brennan et al., 2009). Regardless of the visual impairment, a child must be motivated to “write” or scribble. Similar to typically developed children, these activities enable visually impaired children to spontaneously develop a way of documenting information long before starting school (Corn & Koenig, 2002; Steinman et al., 2006).

4. *The last component of the foundations of literacy is specific perceptive skill.* For children with visual impairment it is important to have individual visual and/or tactile development program with aim to support the important pre-reading skills. The development of tactile skills or visuo-perceptive skills which enable efficient reading and writing using a certain medium is a long process that visually impaired children cannot gain spontaneously. During early childhood it is necessary to expose them to adequate simulative activities. By the age of 3 a child must begin systematic visual or tactile training in order to sufficiently develop needed skills before starting school. Therefore, different perceptual development programs are made. Programs can be aimed towards all perceptual fields like *Perceptual training activities, by Betty Van Witsen*, or they can be specifically conceived for low vision or blind children. One of the most known programs for developing visual perceptive skills, that has been applied successfully for 30 years is the *Program to Develop Efficiency in Visual Functioning, by Nataly Baraga*. Bargas program is aimed towards stimulating basic visual abilities and development of visuoperceptive skills. In order for a blind child to develop specific tactile skills for reading Braille, a systematic, consistent and long preparation is needed. For stimulating tactile functions and developing tactile skills, different tactile training programs, are made, i.e. *Perceptual-motor stimulation, by Kiš-Glavaš, Teodorović,*

Levandovski. Tactile or visual training programs support the gaining of basic fund of perceptual skills which enable visually impaired children to read, when starting formal instruction in literacy.

CONCLUSION

To acquire foundation for efficient learning of reading and writing, visually impaired children need to be enrolled in different stimulative activities from the earliest age. The recommended practice for delivering early intervention services involves working in the homes of infants and toddlers with visual impairment and blindness (from birth to 3 years of age). Family-centered services take place in natural environments and are characterized by collaboration among professionals and family members The importance of family-centered practices is reflected in the vital role that caregivers play in the language and concept development of young children with visual impairment and blindness (Erickson et al., 2007). When children with visual impairment reach 3 years of age along with starting preschool, children need to be engaged in programs designed to support conceptual and language abilities, visual perception and visuo-motor skills, as well as tactile skills, in order to gain adequate skills before starting school and over coming difficulties during initial literacy.

Supporting early literacy development during childhood, and modelling techniques for fostering development of pre-reading skills at home and kindergarten, develops emergent literacy into early formal literacy. Organizational models of early intervention in the area of supporting pre-reading skills strongly affects emergent literacy of visually impaired child. Children with visual impairments benefit when their parents and teachers collaborate to provide appropriate emergent literacy experiences to them. Working together, parents and professionals can provide literacy knowledge and skills similar to those for sighted children (Koenig & Farrenkopf, 1997).

Regardless of which factors interfere with gaining pre-reading skills they can be mitigated by special educational approach. Preventive treatment will make encounters between visually impaired children and the world of literacy much easier, regardless if they will be reading print or Braille.

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STRATEGY AND EFFECTS OF EARLY INTERVENTION IN SURDOLOGY

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SUMMARY

Congenital hearing loss presents important handicap in development of a child because it considerably impacts, not only listening, but speech-language development, cognition and education as well. Hearing impairment is the most frequent congenital sensory defect that affects 1-3 in 1000 newborn babies. Regardless of dynamic development of genetics and other diagnostic procedures etiology of congenital hearing loss still remains unknown in 50% of cases. Early intervention in surdology tends to minimize consequences of congenital deafness. Surdologists insist on early intervention for congenital hearing loss considering the fact that early amplification and rehabilitation should be applied during first 3.5 years of life, while plasticity of central nervous system is maximal. During previous five-year period, from 2006 to 2010, the authors have observed very low rate of early intervention and therefore advocate the need for change of strategy in everyday clinical practice. Strategy for minimizing deleterious effects of congenital hearing loss is based on Early Hearing Detection and Intervention (EHDI) program which will be explained in details. The objective of the study is to evaluate actual strategy of early intervention in surdology. Effects of early intervention for congenital hearing loss in children treated in Audiology Rehabilitation Department of Clinic for ENT and HNS over a period 2006-2010 were analyzed.

Key words: deafness, hearing loss, early intervention, children

INTRODUCTION

Strategy for maximal diminishing consequences of congenital hearing loss is based on early intervention program (EHDI – Early Hearing Detection and Intervention) which consists of following elements: 1. Neonatal screening, immediately after birth up to one month, 2. Diagnosis confirmation up to 3 months of age and 3. Early intervention through amplification and choice of appropriate habilitation strategy, up to 6 months of age. That is the way to achieve the best boost throughout the period of maximal central nervous system plasticity in order to minimize deleterious effect of auditory deprivation. Early intervention is effective system which can prevent or diminish negative effect of congenital hearing loss on speech and language development in children. (Calderon, Naidu, 1999; Kennedy et al., 2006; Moeller, 2000). Congenital hearing loss is a major handicap because it affects not only hearing, but cognition and education as well. It is the most frequent congenital sensory defect affecting 1 to 3 ‰ of newborns (Finitzo, Albright, O'Neal, 1998; Van Naarden, Decoufle, Caldwell, 1999). Despite of progress in genetic testing and other diagnostic studies etiology in 50% of congenital hearing loss is still unknown (Mikić, 2006). The goal of early intervention for congenital hearing loss is improvement of speech and language as well as overall communication capacity (Callow-Heusser, 2011). Intervention in first 3.5 years after birth enables the best results due to maximal plasticity of developing brain (Sharma et al., 2004). That is the rationale for early intervention for congenital hearing loss.

Introduction of neonatal hearing screening had decreased the age of diagnosis of congenital hearing loss considerably. Confirmation of diagnosis of congenital HL by the age of 3 months enables the start of intervention before 6 months of age, thus improving the outcomes. Early intervention with the use of hearing aids and /or cochlear implants improves auditory perception and speech-language development helps congenitally deaf kids to almost achieve milestones of their hearing peers (Mikić et al., 2011). Although neonatal hearing screening is the first step in diagnosis of congenital deafness it is necessary to follow-up all the babies who have failed NHS in order to diagnose those with hearing loss and commence surdological intervention in due time. Without the comprehensive procedure and follow-up it is impossible to achieve optimal results.

The objective of our study was a survey of current state in program of early surdological intervention for congenital hearing loss in Belgrade. Effects of early intervention during the period from 2010 till 2016 have been analyzed using patient files from Audiology Rehabilitation Department in Clinic for Otorhinolaryngology and Maxillo-facial Surgery of Clinical Center of Serbia.

History of early intervention for congenital deafness

Directors of Speech and Hearing Program in State Health and Welfare Agencies (DSHPSHWA) have decided to introduce national program of neonatal hearing screening in early eighties of XX century (Curry, Gaffney, 2010). Joint Committee on Infant Hearing (JCIH) has defined the goals in 1early detection of congenital HL in 1995.

Coverage of NHS in 46 states of North America, Europe, Asia, Middle East, Oceania and Africa during the period 2004-2006 has been 46% despite the recommendation of JCIH of more than 95% (Wolf et al., 2007). The data from 32 countries with local or regional UNHS revealed the coverage of 64%.

"The American Academy of Pediatrics (AAP, 2010) and the Joint Committee on Infant Hearing (JCIH, 2007) have recommended "1-3-6" benchmarks for follow up: (1) complete newborn hearing screening (NHS) before 1 month of age, (2) diagnose HL before 3 months, and (3) enrol those identified with HL in early intervention before 6 months of age (Holte et al., 2012). According to CDC (Centers for Disease Control and Prevention) in 2006, 91.2% of newborns were screened for hearing loss and 2.1 % did not pass the screening (Gaffney, Green & Gaffney, 2010). By 2009, the latest year for which data are available (U.S. Centers for Disease Control, 2011), national statistics improved: 98% of newborns were screened and 1.6% did not pass. (Holte et al., 2012). The major problem in USA is still very high rate of lost to follow-up after failed screening.

Neonatal hearing screening in Europe was implemented in Europe at about same time as in USA. Nowadays, the same timeline of EHDI is administered in Europe as in America: screening before 1 month, diagnosis before 3 months and intervention before 6 months of age. European consensus on neonatal hearing screening required a lot of logistics and legislation, which has been implemented as follows (Grandori, 2002):

- National Institutes of Health Consensus Statement 1993.
- EC-Biomedical & Health Program – Project on Otoacoustic Emissions (CA-OAE) 1993-95.
- World Health Organisation 1995.
- EC-Biomedical & Health Program – Project AHEAD 1996-99.
- European Consensus Development Conference 1998.
- American Association of Pediatrics Statement 1999.
- 1st International NHS Conference, Milan, Italy, 2000.

First decade of EHDI program implementation in Europe (2000-2010) has revealed a lot of factors and obstacles which have caused delays and setbacks. Major problem has been considerable percentage of children who were lost to follow-up (LTFU) after failed screening in maternity wards. Early intervention programs were compromised by concomitant medical conditions in hearing impaired babies, poor parental knowledge regarding hearing loss impact, accessibility of audiological and rehabilitation facilities, long waiting lists, etc. (Holte et al., 2012).

Table 1 *Implementation of NHS and EHDI in Europe in 2006*

EHDI %	Country
> 90%	Austria, Belgium, Croatia Denmark, UK Luxemburg, Netherlands, Poland
20% – 90%	Germany, Italy, Lithuania, Malta, Slovenia, Spain, Sweden, Switzerland, Cyprus
≤ 20%	Czech Republic, Estonia, Finland, Greece, Hungary, Latvia, Norway, Portugal, Romania Slovakia, Turkey

Early detection and rehabilitation of congenital hearing loss in Serbia started in Serbia in late sixties, but were widely implemented in eighties of XX century. Hospital based neonatal hearing screening first started in year 2000. in several maternity wards in Beograd, Novi Sad, Pančevo, Subotica, Sremska Mitrovica, Niš, Užice, but there is still no national UNHS program, despite numerous initiatives. Babies with risk factors for congenital hearing loss were usually referred for audiological assessment, whereas well babies did not have any hearing test. They were not referred for hearing testing unless they had speech delay, between ages 2 and 3 years.

EHDI (Early Hearing Detection and Intervention) in USA has shown progress from 32% of screened babies in 2000 to 95% u 2007, but percentage of LTFU is still extremely high (47%). Percentage of screened babies in EU in 2007 was 45%, with extremely low LTFU rate of 5%. The best national hearing screening program in our region is in Croatia with screening rate of 96% of all new born babies and excellent follow-up and early intervention system (Grandori, 2010).

Table 2 *EHDI protocol following NHS*

OAE screening in hospital				
Pass		Fail		
Risk factors	No risk	Repeat screening using OAE		
Rescreening in 6 months	No further screening	Pass		Fail
		RF	No RF	Rescreening in 3 weeks
		Rescreening in 6 months	No further screening	Audiological and surdological evaluation in 2 weeks

Table 2. shows contemporary protocol for hearing screening procedures. It is adjusted to EHDI principles defined by American Academy of Pediatrics in 2010. It covers the 1-3-6 rule for congenital HL, meaning that every baby should be screened before age of 1 month, diagnosed with hearing loss before age of 3 months and enrolled in early intervention before age of 6 months. Same protocol should be applied for acquired prelingual HL with timeline adjustment according to hearing impairment onset.

Indications for early intervention for congenital hearing loss

Hearing function is developing prenatally (Niparko, Tobey, Eisenberg, 2010). In 26th gestational week foetus reacts to both internal and external sounds. Listening to steady heart beat in utero is an early engram which is a base for subsequent speech development and rhythm of syllables. (Bojanin, 1986). Prenatal reaction to sound is atypical and primitive mostly expressed through acoustic-motor reflex. Listening in foetus is considerably different to that in older babies and infants due to immature auditory system (Warrier et al., 2004).

Hearing is a capability to receive, conduct and process acoustic signals to the brain and store them in the memory to increase knowledge. Development and interactive processes of auditory perception are induced through processing of auditory processing. Auditory perception is closely related to other systems and functions such as attention, memory, emotions and speech.

Learning process develops the ability to differentiate various auditory stimuli. Sensory stimulation leads to classification of the information in appropriate class or impression. Those classes are based on experience. Learning process is affected by development of perception. The process is not static, but could be modified through learning.

Cochlea is fully functional at birth (Kisilevsky, Hains, Jacquet, Granier-Deferre, Lecanuet, 2004). Auditory system is immature: the sound is perceived, but auditory processing is undeveloped. It takes years to achieve full maturation of auditory system. Latencies of cortically evoked potentials and P1 wave, generated in thalamic and cortical structures, are gradually decreasing over time (Sharma et al., 1997; Cunningham et al., 2000; Ponton et al., 2000). Wave P1 latency could be treated as index of maturity of auditory system and is especially useful for studies in auditory derived population (Ponton et al., 2000; Sharma et al., 2002).

The study conducted in Auditory Rehabilitation Department in Belgrade in 1999 has shown that age of diagnosis of congenital hearing loss is affected by the degree of hearing impairment, so that children with profound hearing loss (practical deafness) were diagnosed between ages 1 and 2 y, whereas mild to moderate hearing loss was usually discovered between ages 4.5 and 5.5 y (Ostojić, 1999). There is critical time frame for development of auditory as well as all other sensory functions. Numerous studies have shown the importance of early intervention in order to affect cortical reorganization and prevent cross modal plasticity. Central nervous system plasticity is maximal in the first three years of life. Early intervention is essential for prevention of irreversible changes in CNS induced by long-standing auditory deprivation. There are numerous studies regarding different organization of sensory cortex and takeover of the cortical regions by other sensory modalities such as vision and touch in case of congenital deafness, the phenomenon known as cross modal plasticity (Lee et al., 2001; Neville, Bavelier, 2002; Roder et al., 2002). That could be the explanation for traditional belief that blind people have better hearing acuity, while deaf are more sensitive to visual stimuli. Sensitive period for therapeutic intervention is limited to the first seven years of life (Lee et al., 2001). The results of intervention for congenital deafness are the best before 3 years of life and some impact is achieved in the first 7 years, but in case of late intervention achievement is limited and full maturation of auditory function could never be fully reached.

According to AAP congenital hearing loss of various aetiology is found in 1–3 ‰ of newborns, whereas the percentage of hearing impaired babies is considerably higher in neonatal intensive care units (NICU) reaching 2–4%. In population of newborns with risk factors for hearing loss according to JCIH the rate of congenital hearing loss is 17 times higher than in well baby population according to FDA survey at the age 5-8 years.

Table 3 *Auditory maturation from birth to 24 months (Northern, Downs, 2002)*

Month	Sound dB (SPL)	Speech dB (HL)	Reaction
0 – 1.5	90 in noise 50 – 70 in quiet	40 – 60	Newborn awakes, gross motor reaction
1.5 – 4	50 – 60	45	Eye movements, head shake
4 – 7	40 – 50	20	Head turning, begins to listen
7 – 9	30 – 40	15	Direct horizontal localization
9 – 13	25 – 30	10	Direct localization downwards
13 – 16	25 – 30	5	Direct localization upwards
16 – 21	25 – 30	5	Direct localization sideways, downwards, upwards
21 – 24	25	5	Precise localization in all directions

Discrimination of speech in babies is based on prosody. Young babies can listen to any language with undivided attention. Babies are born with auditory capacity to learn any language. In two month olds they begin to prefer their native language. Ability to recognize contrast in foreign language decreases over time. Baby ignores acoustic details irrelevant for phonetic features of mother tongue. They tend to listen to phonetic details in speech perception rather than words. Babies could discriminate intonation, basic frequency, intensity and duration of acoustic signals at the age 1 to 4 months. Ability to spot fine prosodic information, metric features of speech, such as syllables and accent develops over time. Infants could discriminate emotional connotation of verbal stimuli making difference between angry and tender voice. Four month olds could make connection between auditory and visual presentation of speech. Speech understanding is based on link between auditory perception and visual and tactile perception (Nelson, 1995). Results of numerous studies have proved that early intervention for profound congenital HL (1-3-6 months) enables those children to achieve auditory capacity of their hearing peers by the age of 6 years (Yoshinaga-Itano et al., 1994; Yoshinaga-Itano, Mah-rya, 1998).

That implies the necessity of early surdological intervention. Period of intensive auditory development (perception, processing and language acquisition) is limited. Early intervention for congenital HL could minimize consequences of auditory deprivation. EHDI principles are based on central nervous system plasticity and reorganization which is maximal in the first 3 years after birth. A lot of studies have shown that EHDI for congenital HL leads to speech and language development approaching the development curve for hearing children by the age of 4 years (Yoshinaga-Itano et al., 1998; Mikić, 2006; Ching et al., 2013).

Sample and methodology

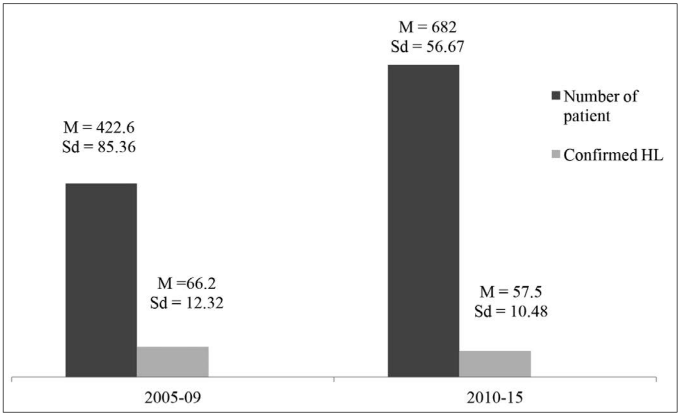
Maternity ward in Clinical Centre of Serbia applies two stage neonatal hearing screening using TEOAE. Babies who failed NHS twice are referred for further audiological testing in Audiology Rehabilitation Department. Test battery consists of Behavior Observation Audiometry (BOA), otoacoustic emissions (TEOAE and DPOAE), tympanometry, acoustic reflex measurements and Brainstem Evoked Response Audiometry (BERA). Audiological assessment is done by multidisciplinary team consisting of audiology physician, surdologist and psychologist. First assessment is done at the age of 1 month and repeated at 3 and 6 months in well babies. In babies with risk factors for HL according to JCIH follow-up period is extended to 12 months and in babies with family deafness to 3 years and more. The study has encompassed 331 baby who were referred for audiological assessment because of failed screening in the period 2010-2015.

RESULTS AND DISCUSSION

Table 4 *Incidence of hearing loss diagnosis among the patients assessed in Audiology Rehabilitation Department of Clinic for ENT and HNS, Clinical Centre of Serbia, in the period 2005-2015*

Year	Number of patients (n)	Confirmed HL (n, %)
2005.	327	80 24.4
2006.	348	69 19.8
2007.	423	74 17.5
2008.	510	49 9.6
2009.	505	59 11.7
2010.	738	61 8.3
2011.	720	76 10.5
2012.	690	53 7.7
2013.	586	51 8.7
2014.	646	58 9
2015.	712	46 6.5

The survey of medical records has revealed ever increasing number of patients referred for audiological assessment. Average number of patients per year has considerably increased in five year period 2010-2015 (682) as compared to previous five year period from 2005-2009 (422.6) The increase in number of patients referred for hearing tests could be explained by introduction of NHS in biggest maternity ward in Belgrade as well as the raised awareness of pediatricians about the importance of early diagnosis and intervention for congenital HL. The public awareness of hearing loss impact possibilities for problem solving has increased lately. Parents, doctors and teachers recognize the problem earlier and react promptly in case of suspected HL or risk factors. Outcomes in children with congenital HL who were involved in EHDI have proved that impact of congenital deafness could be minimized by early intervention. Study by Yoshinaga-Itano, (2003) has shown that children diagnosed with congenital HL before 6 months of age had significantly better vocabulary, general language abilities, speech intelligibility and phoneme repertoires, syntax as measured by mean length of utterance, social-emotional development, parental bonding, and parental grief resolution.



Graph 1 Average number of patients referred for audiology testing and confirmed HL in periods 2005-09 and 2010-15 y, in Audiology Rehabilitation Department

Data shown in *Graph 1* reflect increase of overall number of patients referred for audiological assessment whereas the number of confirmed hearing loss is stable. Incidence of congenital HL remains 1 – 3‰ of live births (WHO, 1995, 2010). The total number of patients with confirmed hearing loss per year in first period 2005-2009 is slightly higher (M=66.2, SD=12.32) than from 2010-2015 (M=57.5, SD=10.48). That could be caused by two possible reasons: slightly lower number of newborns and increased number of diagnostic centres for audiology.

Table 5 *Children without risk factors for hearing loss who failed NHS in Maternity ward of CCS in Belgrade from 2010-2015*

Audiological assessment	Age	N	∑
I	≤ 3 months	82	131
I	> 3 months	49	
II	≤ 6 months	31	36
II	> 6 months	5	
HL diagnosed	< 12 months	3	
Overall HL		4	

Table 6 *Children with risk factors for hearing loss who failed NHS in Maternity ward of CCS in Belgrade from 2010-2015*

Audiological assessment	Age	N	∑
I	≤ 3 months	112	200
I	> 3 months	88	
II	≤ 6 months	65	106
II	> 6 months	41	
III	< 12 months	64	
IV	< 24 months	47	
HL diagnosed < 12 months			
Sensorineural		29	44
Conductive		9	
ANSD*		6	

*ANSD(auditory neuropathy spectrum disorder)

Tables 5 and 6 display the incidence of HL in babies who failed NHS in Maternity ward of CCS in Belgrade with and without risk factors for hearing loss according to JCIH. Joint Committee for Infant Hearing had defined the list of ten risk factors which could possibly cause HL, such as prolonged NICU stay, low APGAR score (>5 days), low birth weight < 1500g, APGAR score 1-3, hyperbilirubinemia, mechanical ventilation > 5 days, intrauterine infection (TORCH), neonatal bacterial meningitis, cranio-facial malformations, ototoxic medication and familial deafness (American Academy of Pediatrics, 2007). Regardless the fact that risk factors for HL could not always be prevented or avoided, it is of utmost importance to register all babies with known risk factors and apply appropriate screening and diagnostic procedures through careful follow-up (Nikolić, Ostojić, 2016).

Table 5 depict the data of audiological assessment in babies without risk factors who failed initial NHS. Audiological assessment was done before the age of 3 months in 82 babies and in 49 babies after that age. Three babies were diagnosed before 12 months of age. Sensorineural hearing loss was diagnosed in 4 children (3%) in population of babies without risk factors who failed NHS.

Table 6 shows the data for babies with known risk factors for HL who failed NHS. First audiological assessment was done in 112 babies before 3 month of age and in 88 after that. Hearing loss was diagnosed before the age of 12 months in 44 babies. Sensorineural HL was diagnosed 29(14.5%) babies. There were also babies with conductive hearing loss (9) and auditory neuropathy spectrum disorder – ANSD (6). There is considerable prevalence of HL in group of babies with known risk factors. Average number of babies with congenital HL in general newborn population is 1.4 per babies screened (CDC, 2009; AAP 2007).

Early diagnosis and intervention for congenital HL have been implemented in Serbia for decades, but there is still no universal neonatal hearing screening or appropriate legislation for introducing national EHDI program. NHS has been implemented over last 12 years in several hospitals, so that percentage of screened newborns is estimated between 12-15%. Lack of national data base results in high percentage of lost to follow-up, so that the number of babies diagnosed with HL in first 12 months of age is still not satisfactory. Successful EHDI program requires legislation, accessible diagnostic equipment, affordable hearing aids and cochlear implants, steady financial resources and well educated and equipped multidisciplinary teams for early identification of HL and intervention. Public awareness and information on congenital HL and importance of early diagnosis and treatment is still insufficient. It has been improved in the last five years, but it is not enough. Coordination of neonatal teams involved in primary NHS and secondary and tertiary audiological facilities is essential. Central national database is required in order to obtain proper follow-up of babies who failed initial screening.

CONCLUSION

The study has analyzed the NHS data from a biggest maternity hospital in Belgrade (GAC CCS) and subsequent audiological assessment in babies who failed NHS in Audiological Rehabilitation Department of CCS in Belgrade from 2010-2015. The results have shown considerable increase in number of patients who were audiological assessment (M=682), in comparison with previous five year period from 2005-2009 (M=422.6). It could be attributed to wider implementation of NHS as well as to increased public awareness of importance and consequences of congenital hearing loss. The results have shown considerably higher prevalence of diagnosed HL in children with known risk factors (29 or 14.5%) as compared to babies without risk factors (4 or 3%). All of those babies were referred for further audiological assessment due to failed NHS. It is in accordance with data that congenital hearing loss is found in 1.4 per 1000 babies screened (CDC, 2009; AAP 2007).

National EHDI strategy in Serbia is compromised at the moment because of lack of universal hearing screening. There is ongoing public initiative for obtaining OAE screeners for all 56 maternity wards in Serbia organized by Ministry of Health and media called “Heart for children”. National program requires more than just screeners. Future parents should be well informed on importance of hearing screening and early detection of congenital hearing loss. National data base and IT network is necessary in order to provide proper follow-up of babies screened. Good network of diagnostic audiology facilities as well as rehabilitation units is needed for continuous EHDI program. It starts on the second day after birth with OAE screening and continues afterwards in case of failed screening according to EHDI protocol and results of audiological assessment and potential risk factors for HL (Table 2).

Effects of early intervention for congenital HL are demonstrated in speech-language outcomes at the age of 5 years comparable with those of hearing peers. EHDI program has decreased age of diagnosis of congenital HL from 30 months before it has been implemented to 3-6 months nowadays.

Multidisciplinary team of Audiology Rehabilitation Department of Clinic for EN and HNS of Clinical Center of Serbia has been dedicated to early detection and rehabilitation of children congenital hearing loss and/or complex needs for decades. The results were presented in several international and national projects as well as on numerous international conferences, published in international and national journals and books. The achievements of our team were highly regarded both abroad and in Serbia. Principles of early diagnosis and treatment of congenital HL have been established in 1967 through international collaboration with experts from USA, and developed ever since. Hospital based NHS introduced in 2000 has improved early diagnosis and introduction of digital hearing aids and cochlear implantation for profound hearing loss in 2003 has improved rehabilitation options and outcomes. Audiological assessment is done periodically every 3 to 6 months in order to monitor hearing thre sholds and maturation. Rehabilitation is tailored to the child abilities and progress and is provided 5 days a week, twice a day for older children. Rehabilitation program for each child is individually designed and progress is monitored and discussed on regular team meetings. Percentage of mainstreamed children with HL is steadily increasing. Inclusive system of education of deaf children in mainstream schools is still to be improved providing individual curriculum and education assistant in order to stimulate maximal achievement for each child with hearing loss.

Families of deaf children have some financial support through Ministry of health and Ministry of Social Affairs, but it is usually not enough to cover real cost of rehabilitation for years. Accessibility to hearing aids and cochlear implants is relatively good but it should be even better in future.

Continuous education of all professionals on the diagnostic and rehabilitation team is mandatory as well as improvement of technical support for diagnostic and rehabilitative equipment. Strategy for early detection and intervention for congenital hearing loss should be national priority because the results of early treated hearing loss were proved to be cost effective for the society and last, but not least, a huge improvement in quality of life of a deaf child and his family.

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IMPORTANCE OF EARLY CHILDHOOD DEVELOPMENT COUNSELING IN THE PROCESS OF PREVENTION AND EARLY INTERVENTION IN CHILDREN WITH RISK FACTOR AND DISABILITIES

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SUMMARY

Early Childhood Development (ECD) counselling is an integral part of the prevention program of children's medical center for children with risk factors and disabilities. The main activity is the early detection of developmental disorders, diagnosis, treatment, and providing a stimulating, if necessary, referral to a higher level of health protection of children with psychomotor development. The aim of this study was to determine the frequency and types of support in ECD counselling in the community of Palilula in Belgrade for the period 2010-2014. The sample is consisted of children who have come to ECD counselling for the period 2010-2014. The scientific work used data from Heliant Health Information System from October 2010 to December 2014. The obtained results showed that in 2012 the ECD counselling in the community of Palilula was realized most services (n=13 323), among which are the most common therapeutic procedure services of voice and speech disorders (n=6 718) and speech functions test (n=3 438), a minimum of service (n=11 657) realized in 2014. Services delivering in ECD counselling conducted by a team, consisting of a pediatrician, psychologist, social worker, special educator, speech therapist and a nurse who are focused on prevention and early intervention.

Key words**:** Early Childhood Development counselling, prevention, early intervention, children with risk factors, children with disabilities

INTRODUCTION

Early Childhood Development (ECD) counselling is an organizational unit which has its own specific objectives, tasks and activities remain unchanged regardless of where it is and in which institutions exist (Marković & Arsić, 2011). In the community covered by the Health Centre it can be arranged ECDcounselling ifhas at least 8 500 preschool children according to the ordinance on detailed conditions for performing health services in health institutions and other aspects of health services (22/2013, Article 4). The ECD counselling identify interference or developmental disorders and conduct check-ups of children at risk and children with disabilities, so that they would mitigate or eliminate (re) habilitation treatment. According to Vasić et al., (2006) main tasks of ECD counselling are: active monitoring of children who are under the biological risk (pathological pregnancy or childbirth, premature babies, hereditary or infectious disease), early detection of children with sight, hearing and motor skills; monitoring of children under psychosocial risk (children deprived of parental care, alcoholism, mental illness in the family, social and cultural deprivation); implementation of consulting parents, teachers, guardians and teachers for the correct and appropriate development incentives; implementation of the planned and systematic treatment of children with mild developmental psychomotor and speech disorders; referral of children with severe mental health disorders to specialized services for further treatment; cooperation with kindergartens for early detection and monitoring of the functioning of the risk children and children with disabilities. ECD counselling has a multidisciplinary approach in the implementation of tasks with a team consisting of a medical doctor, pediatrician, nurse – technician, psychologist, speech therapist, social worker and special educator, who cooperate with health care institutions, with institutions of social care, as well as with educational institutions (Ljubešić, 2003).

Early detection and stimulation of development of children with risk factors has influence on reduction in the number of children with disabilities in later development. The process of providing early intervention services to child begins at birth and lasts until the start of school, and therefore includes the provision of services to children, their parents, other family members in the form of information, rehabilitation and counselling (Košiček et al., 2009; Ljubešić, 2003; Pinjatela & Joković-Oreb, 2010). Early intervention is focused on the prevention of difficulties and their limitation to a minimum, with the aim of improving the health and well-being of children, their capabilities, minimizing the difficulties of development, mitigation of existing problems or risk factors, prevention of deterioration of function, promote adaptive parenting and improve the functioning of the family (Shonkoff et al., 2000; according to Pinjatela & Joković-Oreb, 2010). Spiker, Hebbeler and Mallik (2005), suggest that the first three years of life are the most important for early intervention. Therefore, it is of importance to the process of stimulation, education, rehabilitation and treatment starts immediately after determining the risk of problems or difficulties in developing detection (Ljubešić, 2012). The Child's development will be promoted through individualized or specialized treatment as the support starts earlier (Landesman, Ramey, Ramey & Lanzi, 2007). Many studies point to a temporary positive effect of early intervention programs on motor and cognitive development in children at high risk for developmental disorders (Als, 1994; Jacobs et al., 2002; Symington et al., 2003; according to Pinjatela & Joković-Oreb, 2010).

A review of current literature and experience turned out that the work of the ECD counselling is of great importance to identify children with risk factor and children with disabilities, for the prevention and early intervention through support, counselling, stimulation of early development or rehabilitation treatment. The Unified ECD counselling early intervention measures are provided individual child and the family in order to protect early development, reduction or elimination of developmental disabilities through activities habilitation and rehabilitation treatments, all in cooperation with other institutions.

METHOD

The aim of this study was to determine the frequency and types of support in ECD counselling in the community of Palilula in Belgrade for the period 2010-2014. Target of research is to present the character of development and the possibility of counselling to the general public.

The survey was conducted in 2015 at the Health Centre “Dr Milutin Ivković” Palilula in Belgrade. The sample consisted of children who are during the period 2010-2014 came to the ECD counselling in the community of Palilula. This scientific work used data from Heliant Health Information System since the beginning of its operation in October 2010.

RESULTS

Table 1 *Number of visits to Department for pre-school children in the community of Palilula 2010-2014*

Department for pre-school children	2014		2013		2012		2011		2010	
	N	%	N	%	N	%	N	%	N	%
Borča I	4 190	27.93	4 112	28.00	4 047	28.25	3 760	27.26	0	0.00
Karaburma	4 106	27.37	4 101	27.93	4 059	28.33	4 043	29,32	0	0.00
Krnjača	2 384	15.89	2 294	15.62	2 298	16.04	2 078	15.07	0	0.00
Stara Palilula	2 859	19.06	2 802	19.08	2 612	18.23	2 670	19.36	1 889	100.00
Padinska skela	1 461	9.74	1 376	9.37	1 311	9.15	1 240	8.99	0	0.00
Total	**15 000**	100.00	**14685**	100.00	**14 327**	100.00	**13 791**	100.00	**1 889**	100.00

The department of health protection of pre-school children is organized to work with children from birth to school age. In addition in treatment of sick children it is conducted continuous monitoring of their growth and development, planning of measures and activities for early detection of health disorders. According to analyzed data (Table 1), we found that for the period 2010-2014 the highest recorded patients are in the section Borča I (n=4 190) during the year of 2014, while in 2011 it was the lowest incidence of patients (n=1 240) in the section of Padinska Skela. The number of patients increased in all section for pre-school children in the community of Palilula in the period 2010-2014.

Table 2 *Number of visits, contacts and services ECD counselling in the community of Palilula*

Years	Number of patients	Number of contacts	Number of services
2010	159	876	1099
2011	2997	10790	11695
2012	3812	12273	13323
2013	3263	11773	12882
2014	3290	10893	11657

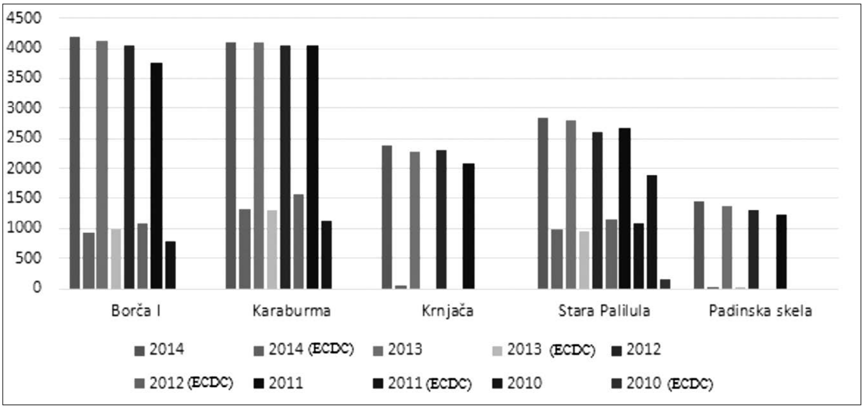
Our analysis suggests that in 2012 there were 12 273 recorded contact, 3 812 patients and 13 323 implemented services. Also, it was noted that the number of patients decreased from 2014, as well as a number of services (Table 2).

Table 3 *Number of visits in the departments of ECD counselling at the community of Palilula 2010-2014*

Department of ECD counselling	2014		2013		2012		2011		2010	
	N	%	N	%	N	%	N	%	N	%
Borča I	934	28.39	983	30.13	1 073	28.15	790	26.36	0	0.00
Karaburma	1 333	40.52	1 311	40.18	1 579	41.42	1 123	37.47	0	0.00
Krnjača	39	1.19	0	0.00	0	0.00	0	0.00	0	0.00
Stara Palilula	984	29.91	968	29.67	1 160	30.43	1 084	36.17	159	100.00
Padinska skela	2	0.06	1	0.03	0	0.00	0	0.00	0	0.00
Total	**3 290**	100.00	**3 263**	100.00	**3 812**	100.00	**2 997**	100.00	**159**	100.00

According to analysis of the data shown in Table 3, we came to the conclusion that in the departments of ECD counselling Karaburma was more patients, then in the section Stara Palilula and Borča I in the period 2010-2014, while the lowest prevalence was recorded in section Padinska Skela in the period 2013 and 2014, and the section in Krnjača for the period of 2014. There have been no visits to counselling section in Krnjaca Development during the period 2010-2013, as well as in the section Padinska Skela for 2010-2012.

According to analysis of diagnosis in the ECD counselling service in 2014, we found that the 162 diagnoses whose frequency was recorded 10 365 times and the total number of patients was 3 290. The most common diagnosis is for speech disorder (n=1 287), the problem in education (n=249), the problem of the motor development (n=94), as well as other health disorders.



Legend: ECDC- Early Childhood Development counselling

Figure 1 Number of visits of Department for pre-school children in ECD counselling to the community of Palilula 2010-2014

According to data from figure 1 we can see that the incidence was highest section of Borca I and Karaburma in the period 2010-2014.Furthermore, the Department for pre-school children in Stara Palilula, section of ECD counselling has been addressed to the half of the children to use the services. ECD counselling Krnjača and Padinska Skela recorded a minimum of patients who use the services of the Development of counselling.

Table 4 *Realized ECD counselling services in the period 2010-2014*

Services	2010		2011		2012		2013		2014	
	N	%	N	%	N	%	N	%	N	%
Group health and educational work	2	0.18	52	0.44	9	0.07	1	0.01	0	0.00
Individual health and educational work	305	27.75	1 375	11.76	1 551	11.64	1 497	11.62	1 209	10.37
Control children (regular, in the case of tracking disorders)	2	0.18	351	3.00	295	2.21	194	1.51	297	2.55
Speech functions test	72	6.55	2 633	22.51	3 438	25.80	2 831	21.98	2 671	22.91
Therapeutic procedure of voice and speech disorders	505	45.95	6 116	52.30	6 718	50.42	7 109	55.19	6 141	52.68
Mental function test	171	15.56	506	4.33	584	4.38	632	4.91	836	7.17
Individual psychological counselling	40	3.64	529	4.52	654	4.91	549	4.26	456	3.91
Group psychological counselling	1	0.09	126	1.08	73	0.55	63	0.49	41	0.35
Number of medical referrals for specialists	1	0.09	7	0.06	1	0.01	6	0.05	6	0.05
Total	**1 099**	100.00	**11 695**	100.00	**13 323**	100.00	**12 882**	100.00	**11 657**	100.00

The analysis shows that in 2012 was the most implemented services (n=13 323) in 3 812 children with risk factors or disabilities. The services are mainly related to the therapeutic procedure of voice and speech disorders (n=6 718) and speech functions test (n=3 438). The lowest number of provided services (n=11 657) were realized in 2014 for 3 220 children with risk factors or a disability, not counting the year 2010, since data analysis does not cover the entire year. The most commonly implemented services for 2010-2014 is a therapeutic procedure that refers to a disorder of voice and speech, speech functions test and individual health and educational work (Table 4).

Table 5 *Services in ECD counselling to the team in 2014*

Team	Services	Total	
		N	(%)
Speech therapist	Individual health and educational work	233 2	(2.58)
	Speech functions test	670	(29.52)
	Therapeutic procedure of voice and speech disorders	6 141	(67.90)
Speech therapist total		**9 044**	(77.58)
Social worker	Individual health and educational work	527	(48.98)
	Control children	1	(0.09)
	Mental function test	512	(47.58)
	Individual psychological counselling	36	(3.35)
Social worker total		**1 076**	(9.23)
Specialeducation teacher	Individual health and educational work	282	(35.88)
	Mental function test	194	(24.68)
	Individual psychological counselling	294	(37.40)
	Group psychological counselling	16	(2.04)
Special education teacher total		**786**	(6.74)
Psychologist	Individual health and educational work	158	(35.99)
	Group health and educational work	2	(0.46)
	Mental function test	129	(29.38)
	Individual psychological counselling	125	(28.47)
	Group psychological counselling	25	(5.69)
Psychologist total		**439**	(3.77)
Doctor	Individual health and educational work	6	(1.94)
	Control children	296	(95.48)
	Speech functions test	1	(0.32)
	Individual psychological counselling	1	(0.32)
	Medical referrals for specialists	6	(1.94)
Doctor total		**310**	(2.66)
Special educator for motors disorders	Individual health and educational work	1	(50.00)
	Mental function test	1	(50.00)
Special educator for motors disorders total		**2**	(0.02)
Total		**11 657**	(100.00)

ECD Counselling service is represented by teamwork involving a pediatrician, nurse, psychologist, social worker and special educator. Their work is focused on the prevention of difficulties and to reduction of opportunities for the development of permanent interferences and disability in children. The team includes speech therapist and special educator for motors disorders that accompany, encourage and promote physical and mental health of children born at risk or with diagnosis of a certain disability. After examining the data analysis (Table 5), we see that can the all the members of the expert team conducted the service of individual health and educational work, which includes preventive health services-advisory work with individuals in counselling in the clinic, the planned talks, counselling the phone or internet counselling, as well as listing data in medical records. On the other hand psychologist leads a group of health and educational work, which includes the services of organizational meetings, lectures, health forums, working with small and large groups, creative workshops, demonstrations of skills, and work in the community and enter data in the medical records. Test of mental function which includes psychological testing of all functions including the social survey, conducted by a social worker, a special educator, psychologist and speech therapist. Pediatrician and speech therapist conducts speech functions test which includes speech and language testing and assessment of the status of graphomotor. In addition to this test, a speech therapist also works therapeutic procedures relating to voice and speech disorder that involves treatment SAFA equipment, voice and speech exercises. Pediatrician, psychologist, special educator and social worker conduct individual psychotherapy that involves individual psychological counselling, while group therapy leading psychologist and special educator and it includes family and marital counselling. We can see that in 2014 conducted 11 657 services, where the speech therapist realized 9 044 services of which 6 141 therapeutical procedure relating to disturbance of voice and speech. The social worker was implemented in 1 076 services and a maximum of services concerning individual service of the health and educational work (n=527). Special educator teacher conducted 786 services, 439 pediatric services, especially check-ups, a special educator for motors disorders only two services.

Table 6 *RFZO data for ECDl counselling services by years*

	2014			2013			2012			2011		
	Finished	Plan 2014	%	Finished	Plan 2013	%	Finished	Plan 2012	%	Finished	Plan 2011	%
Doctors work	**227**	**255**	**89.0**	**168**	**240**	**70.0**	**240**	**315**	**76.2**	**315**	**400**	**78.8**
Examination newborns	227	255	89.0	168	240	70.0	240	315	76.2	315	400	78.8
Psychologist work	**1314**	**982**	**133.8**	**1188**	**1271**	**93.5**	**1284**	**1120**	**114.6**	**1127**	**600**	**187.8**
Mental function test	819	490	167.1	595	559	106.4	572	490	116.7	503	400	125.8
Individual psychological counselling	455	360	126.4	532	638	83.4	638	510	125.1	501	200	250.5
Group psychological counselling	40	132	30.3	61	74	82.4	74	120	61.7	123	/	/
Speech therapist work	**8697**	**9790**	**88.8**	**9606**	**10191**	**94.3**	**9959**	**10390**	**95.9**	**8441**	**11546**	**73.1**
Speech functions test	**2750**	**2990**	**92.0**	**2898**	**3694**	**78.5**	**3454**	**4300**	**80.3**	**2692**	**7246**	**37.2**
Speech functions test for children at risk (6-36 m)	490	250	196.0	719	610	117.9	1105	690	160.1	/	/	/
Speech functions test – health check to 4 years	467	1050	44.5	399	1484	26.9	377	1780	21.2	/	/	/
Speech functions test – health check to 6/7 years	1793	1690	106.1	1780	1600	111.3	1972	1830	107.8	/	/	/
Therapeutic procedure of voice and speech disorders	**5947**	**6800**	**87.5**	**6708**	**6497**	**103.2**	**6505**	**6090**	**106.8**	**5749**	**4300**	**133.7**

According to data from the RFZO for the type of services in ECD counselling and implementers shown in Table 6, we can see that the performance of doctors and speech therapists for the period 2010-2014 was lower than planned for each year. Performance of psychologist in 2013 was lower than planned (93.5%), while more execution was in 2011 (187.8%) in 2012 (114.6%) and 2014 (133.8%).

DISCUSSION

Health care of children is achieved at the primary level through the institution of the Health Centre, which forms an integral part of the basic health system. Regulation on the National Programme for the promotion of early childhood development (2016), a network of health institutions in the field of improving early childhood development includes 25 institutes for public health, 158 health centers with services for the health care of pre-school children and 23 ECD counselling organized as organizational unit of the health center. In this scientific work, it is presented the work of ECD counselling within the Health Center in the community of Palilula in Belgrade (Borča I, Karaburma, Krnjača, Stara Palilula and Padinska Skela). The content of their work is part of a prevention program aimed at timely detection of children with risk factors and children with disabilities from birth to school age. Primary health care is a natural starting point for identifying and addressing the needs of children with disabilities (World Health Organization, 2011; Vargas-Barón & Janson, 2009), with appropriate referral for more specialized needs where required (World Health Organization, 2011). Primary health-care workers can assist in the identification of children with disabilities, that are often hidden in their communities and denied the access to health care, and support their inclusion in health-care activities such as immunizations (UNICEF, 2007). Where possible all centre-based health services should incorporate early identification, intervention and family support components as part of existing services. Developmental screening involves the detection of disability in children within the primary health care. Screening involves assessing children's progress against developmental milestones (sitting, crawling, standing, walking, talking and handling objects) as well as examining vision and hearing. As a child's development is exponential during the first three years of life, developmental screening is a particularly effective measure for early identification of potential problems, and thus for early intervention (Baez, 2000). In addition to identifying children with risk factors ECD counselling includes diagnosis, treatment, habilitation, rehabilitation, as well as control and monitoring of the growth and development of children with a risk factor. The pediatrician has a key role as they monitors the growth and development of the child, his progress, they estimates the same diagnose possible delays in growth and development, points to the need of additional diagnostics, follows the same results and giving advice to parents. If there is some problem in the growth and development of the child's pediatrician children's medical center suggests parents ECD counselling, where a team of experts assesses the overall development of the child (Muanović & Novak, 1998). In their study by Đorđević, Atlagić, Lisov Gazivoda and Barjaktarović (2003) in ECD counselling of Children dispensaries at VMA it is stated that out of 281 child at birth 60 (21.35%) had one or more risk factors, a during the systematic review in the second year it was attended by 25 (8.89%) children. Slowed psychomotor development had only two children (0.71%), and they immediately intervened habilitation or rehabilitation.

The individual child and family in ECD counselling is represented by a multi-disciplinary approach, while consolidating measures directed towards. According to the expert-examination procedure for the implementation of the Regulation on the National Programme for Health Care of Women, Children and Youth (2009), a permanent team of experts ECD counselling are consisted of: pediatrician doctor with training for work in the ECD counselling, clinical psychologist, speech therapist or special educator and nurse. They can also engage experts from other home health services: social worker, nurse, physiotherapist, speech therapist, child neurologist, child psychiatrist and experts of other specialties. In the community of Palilula, ECD counselling team is composed of: a pediatrician, nurse, psychologist, social worker, special educator, speech therapist. This team of experts realized services according to the rules governing the determination of prices of health services at the primary level of health protection (2013), it is found that in 2014 conducted 11 657 services, where the speech therapist realized 77.58% services. Most services (n=6 141) were related to the therapeutical procedure of voice and speech disorder. The social worker was implemented in 9.23% to a maximum of services and individual service of the health and educational work (n=527), a special educator conducted 6.74% services, followed by 3.77% pediatric services, primarily control inspections and a minimum service is implemented special educator for motors disorders (see Table 5). In addition, team conducts counselling of parents on developmental-stimulating behavior towards children and educate parents in the acquisition of skills due to stimulate psychomotor development of the child. The research results indicate that the co-operation of experts improves the availability of services (Iversen et al., 2003) and quality of services provided (Spittle et al., 2002). Franz (2000), Ljubešić (2009) and Prince (2010) emphasize the importance of better cooperation between parents and experts for the successful outcome of early intervention. Services implemented by the speech therapist in counselling Development in the community of Palilula in accordance with the analysis of the data diagnosis in ECD counselling service in 2014, where it was found that the most common diagnosis related to the speech disorder (n=1 287), then the problem in education (n=249) and the problem of the motor development (n=94), as well as other health disorders, which does not explain the fact that special educator for motors disorders has conducted a minimum of services. Golubović, Marković and Perović (2015) reported that one of the most common reason (more than 50%) for which parents pay experts for help are problems in speech. By the end of the first year, 43% of parents said they first noticed problems in children, and 25% of children in this age group had identified a problem, and it is also included in the treatment. About 55% of children are involved in organized work from the third year onwards.

With regard to the early identification and early intervention for children with disabilities access is uneven. Children with disabilities do not have uniform availability of qualified teams and appropriate therapeutic treatments. Distance of such services from the place of residence, a significant number of children reduces the possibility of strengthening the remaining development potential (Regulation on the National

Programme for the promotion of early childhood development, 2016). According to study conducted by UNICEF and the Republic Statistical Office entitled "Multiple indicators of women and children in Serbia – MIKS" for the period 2005-2006, it was found that 11.3% of children have at least one form of disability. Prevention of developmental problems in practice is achieved through preventive work of health centers by monitoring the growth and development of infants and young children, the provision of an enabling development, early detection of signs of developmental disorders by taking specific measures and the initiation of treatment. At each review, the doctor is obliged to thoroughly analyze and assess ways of protection, because these are the points of support in encouraging the proper development and accordingly directed further action or making the ECD counselling. Therefore, the analysis of results showed that in 2014 there were 15 000 patients in the department of pre-school children Borča I, Karaburma, Krnjača, Stara Paliliula and Padinska Skela.

The services are mainly related to the therapeutic procedure of voice and speech disorders (50.40%) and speech functions test (25.80%). The lowest number of provided services (n=11 657) were realized in 2014 for 3 220 children with risk factors or a disability (see Table 4). There were more patients in the departments of ECD counselling Karaburma, then in the section Stara Palilula and Borča I for the period 2010-2014. There were no visits to ECD counselling in Krnjača during the period 2010-2013, and in section of Padinska Skela for the period 2010-2012 (see Table 3). We came to the conclusion that of the total number of patients in the same department of pre-school children in ECD counselling in section Borča I and Karaburma it has been sent four times less children. Furthermore, the department pre-school children in Stara Palilula addressed to the half of the children to use the services in section ECD counselling, while in the section ECD counselling Krnjača and Padinska skela recorded a minimum of patients who use the services of the same counselling (see Figure 1).

Expansion of Early Childhood Intervention must target those children most in need of early childhood stimulation and development – including children with disabilities and those from poor communities. This means that not only the facilities need to be accessible, but programmes need to be appropriate and inclusive of children with disabilities. Special educators need to be educated to provide the necessary support for these children. The expansion of Early Childhood Intervention services therefore creates the opportunity of mainstream measures to improve access for children with disabilities.

CONCLUSION

General conclusions would relate to the following:

1. Early Childhood Development counselling has an important role to play in-registration and monitoring of children born out of risky pregnancies, children born at risk as well as children with disabilities in early development.
2. It is implemented early intervention in the Early Childhood Development counselling, which represents the prevention of risk factors and difficulties

that occur in early child development and conducted stimulating treatments, as well as the earliest interaction between the child and his environment.

3. The importance of the Early Childhood Development counselling is that through the early intervention in children with risk for disabilities and children with disabilities have already emerged achieve normalization function.
4. It is represented a multidisciplinary approach to the problem in the Early Childhood Development counselling, and a significant role is reflected to cooperation with other healthcare services, with educational institutions and social welfare.
5. Through clinical and educational activities, special educator are carried out prevention of motor disorders, early detection, diagnosis and habilitation-rehabilitation treatment.
6. Local communities should learn about the importance of the Early Childhood Development counselling for early intervention and the need for establishing them as well as to support already formed units.

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EARLY INTERVENTION IN CHILDREN WITH AUTISM SPECTRUM DISORDERS IN REPUBLIC OF MACEDONIA

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SUMMARY

Introduction: *Epidemiological studies detected that autism spectrum disorders (ASD) are currently raising, and there is a need for early effective interventions to manage the characteristics of the disorder. The evidence suggests that early intervention programs are beneficial for children with autism, often improving developmental functioning and decreasing maladaptive behaviors and symptom severity.*

The ***aim*** *of this research is to gain the opinion of the parents of children with ASD in Republic of Macedonia concerning the early intervention programs which are currently being conducted.*

Methodology: *Internet based research was conducted from 1st of April until 1st of June. Parents of children with ASD completed 72 questionnaires via an online Google Form. The participants were from all across the Republic of Macedonia.*

Results: *Around 2/3 of participants started with early childhood treatments aged between 2 and 4 years. The most popular treatments are: training of social skills in 24% of children, psychomotor re-education in 22%, biomedical treatment and treatment with medicaments in 26%. 38% are not satisfied with the current treatments. Around half of participants were optimistic and expect a high level of improvement. One third of parents spent between 250 and 350 Euros for the treatments.*

Conclusions: *In Republic of Macedonia there is no systematic approach to early intervention services and programs. Sometimes they use unproven treatments which can be dangerous for the health. ABA and TEACCH approaches are used for a very low number of children. Authorities must start with use of certificated programs for training the professionals.*

Key words: early intervention, treatment, autism spectrum disorders, Republic of Macedonia

INTRODUCTION

Autism spectrum disorders (ASD), characterized by impaired social communication and interaction and by restrictive patterns of behaviors and interests, affects more than 1% of children (Center for Disease Control and Prevention, 2014). Cognitive impairment, psychiatric disorders, sensory disturbances, and behavioral problems are co-morbid conditions with ASD. The complexity of the clinical presentation therefore requires early and appropriate intervention to promote positive outcomes for children and families.

Early intervention can be defined as a combination of services such as occupational therapy, speech and language therapy, physical therapy, developmental therapy,

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psychological services, and social work services. Although all of these services are available, depending on the specific child, services will be chosen accordingly. Each child who receives early intervention services is assessed under three categories being "a) child has a developmental delay, b) child has a diagnosed medical of physical condition with a high probability of leading to developmental delay, and c) child is at risk of developmental delay (the final category is up to the state's discretion)" (Boyd & Shaw, 2010).

Many research studies have shown that there is a great difference in the development of children with autism who have been involved in early intervention (EI) or early treatment programs.

According to Schumway and Wetherby (2009) the second year of life is a critical time to examine the early development and emerging symptoms of ASD with the hope that EI can preempt significant symptoms. Due to this recent knowledge, it is critical to not only identify the disorder early, but also begin to receive various early intervention services in a timely manner.

Evidence has been presented that behavioral treatment for ASD makes the most impact when it is started early, is of high quality with adequately trained and supervised staff, gives a sufficient intensity-level of services (25-40 hours a week) and adheres to evidence-based strategies published in the scientific literature (Stahmer & Ingersoll, 2004).

Parent-mediated early intervention probably does ameliorate the core symptoms of autism, although the magnitude of the effect is too small to recommend its use in routine secondary care settings. A case can be made for employing low-intensity interventions in suitably screened populations, in an attempt to reduce population prevalence. While the overall case for the added benefit of high-intensity interventions is moot, it seems clear that they do work especially well in some cases, for example in young children in whom significant autistic symptomatology is present alongside good linguistic and cognitive ability (Smith, Klorman and Mruzek, 2015).

There have been several research studies to show the effects of early treatment program. At least six comprehensive treatment programs designed to stimulate widespread changes in young children with autism have published positive outcome data in peer-reviewed journals. It is important to point out that none of these studies used the most rigorous experimental designs, involving random assignments of children to groups and the use of evaluators blind to all aspects of the study. The studies differed in many ways, including different curricula, different settings and ratios, different ages and functioning levels, different ways of measuring progress, and different kinds of comparison groups or strategies for looking at change. However, many commonalities occurred in the results of the six studies. All the studies reported significant acceleration of developmental rates, resulting in significant IQ gains; significant language gains in the treated children; improved social behavior and decreased symptoms of autism (Rogers, 1996).

Methods of providing services are changing. Instead of being directed on a particular disability, early intervention is increasingly being organized as non-categorical or cross-categorical services. This trend is somewhat bypassed in the area of autism spectrum disorders due to the fact that treatment of certain forms is highly specialized and focused on core deficits in autism (Glumbić, Brojčin and Đorđević, 2013).

METHODOLOGY

The goal of the research is to see what the opinion is of the parents of children with ASD in the Republic of Macedonia regarding the early intervention programs that are currently being conducted and which programs would they wish to be able to chose from or to have chosen if they had the chance as an early intervention program for behavior treatment. During the period in which we have conducted the research we gave out 72 questionnaires which were completed by parents of children with ASD. There were no age or sex limitations in the study.This internet based research took place from the 1st of April until the 1st of June. Parents of children with ASD completed 72 questionnaires via an online Google Form. The participants were from across all regions of the Republic of Macedonia. The data were analyzed using descriptive analysis. For the purpose of the research we have made a questionnaire that was adapted towards the needs in the Macedonian population (we took into account all the differences between our society and the western countries and adapted the questionnaire). The questionnaire is a closed form consisting of 21 questions, where there are several answers to which the parents may choose from. The results are shown by relative frequencies.

RESULTS

This is a first study about early intervention of children with autism spectrum disorders in the Republic of Macedonia, which has shown that there is no systematic approach for early treatment of that vulnerable group of children. In this study 72 parental questionnaires were analyzed.

On the first question, at what age they started with the first treatment for their child, we found that around 19% started at age 2 years, 63% between 2 and 4 years, 17% between 4 and 7 years and last 1% older than 7 years of age. The distribution of the answers is not so concerning because around 2/3 of participants started with early childhood treatment at age 2 to 4 years which is world trend (figure 1).

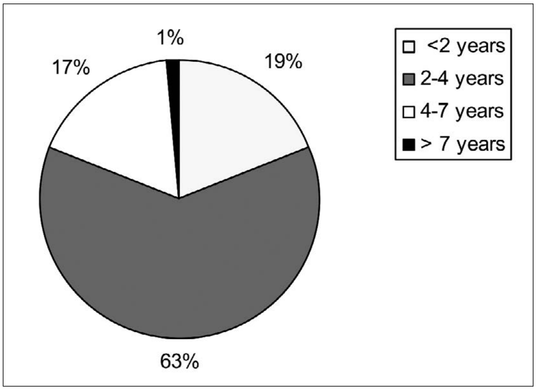

Figure 1 Age of starting early treatment

At the time of the research, the children were receiving various kinds of treatments. The most popular were: social skills training in 24% of children, psychomotor re-education in 22%, biomedical treatment and treatment with medicaments in 26% and 21% were accessing other kind of treatments. A very small number of children, 4%, used ABA and 3% TEACCH approaches, which shows a very low level of usage of those evidence based treatments in our country (figure 2). There are no certificated professionals who can implement these approaches.

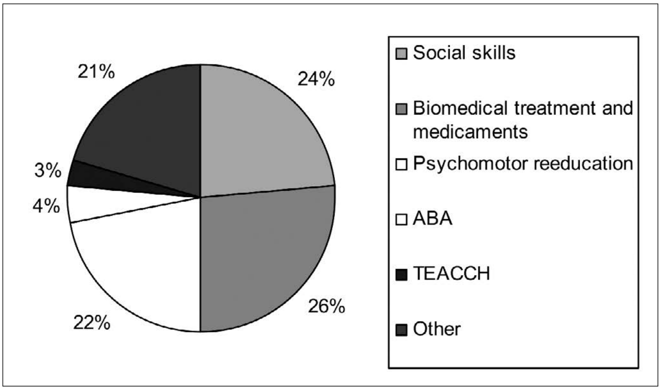

Figure 2 Type of treatments

Parents were asked who covered expenses for the treatment and they replied that 1% are funded by the public school system, 10% by state fund early childhood programs, 3% by a special school and 86% from their own resources (figure 3). This is very frustrating for the parents because the government doesn't allocate enough resources in this sector and parents have to pay from their own budget which impacts their quality of life.

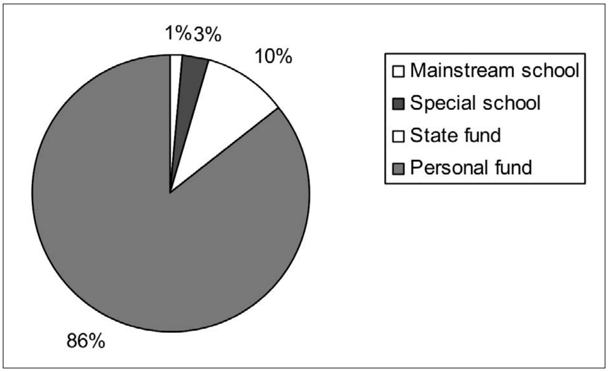

Figure 3 Funding of early treatment

Around one third or 35% of parents were satisfied with the early intervention which their child received at the time of researching. Despite this group of parents, 38% are not satisfied and they think that the Ministry of Health should introduce new interventions. The other 27% of parents gave no opinion either way (figure 4).

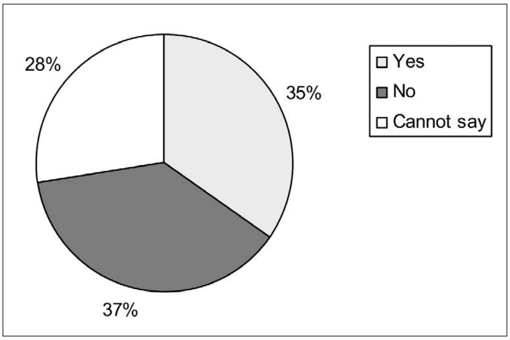

Figure 4 Satisfaction with early intervention

Among parents, 3% didn't expect any improvements of the condition of their child with the usage of an early intervention program, whilst 13% expected minimal improvement and 37% expected a moderate improvement. Around half of participants or 47% were optimistic and expected a high level of improvement (figure 5).

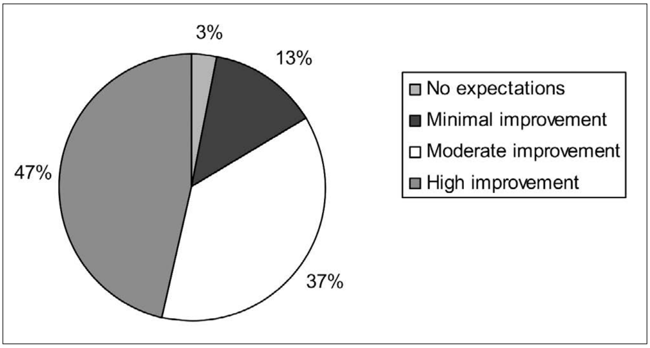

Figure 5 Expectations of improving the condition

Related to the previous question, the next question asked about the actual improvement of the condition of their child. The question whether treatment improved the condition of their child, 81% answered positively and other 19% could not see any improvements in the symptoms and characteristics of their child (figure 6).

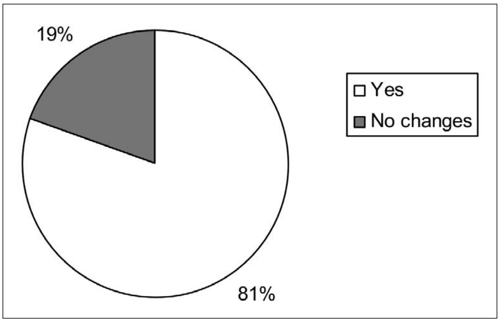

Figure 6 Whether treatment improved the condition of the child

Figure 7 shows the results of cost of the treatment. It is notable that 35% of parents spent 5000 Denars on various kinds of treatments. 33% of them spent 10000 Denars from their own budget. The other third of parents spent more than 10000 Denars, of which 16% spent 15000 Denars and the last 16% of parents spent more than 20000 Denars per month, which is the average salary in Republic of Macedonia. It is a large amount of money. This is because the Ministry of Health doesn't prioritize the needs of the children with ASD.

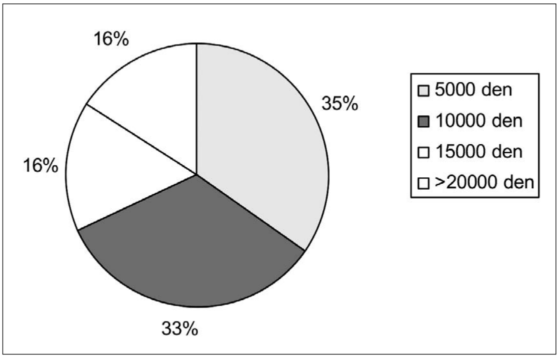

Figure 7 Cost of the treatment

Relating to the question, "Which early intervention program do you think should be implemented in state institutions in the Republic of Macedonia?", 50% of parents want ABA, 22% answered Son-Rise, 17% would like TEACCH and 11% want other programs (figure 8). The distribution of these answers clearly shows the urgent need of the implementation of ABA programs in the larger towns in the country.

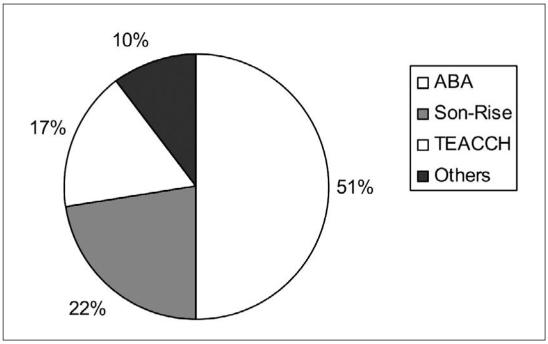

Figure 8 Which early intervention program should be implemented in state institutions

DISCUSSION

When early intervention is implemented into the daily life of a child with autism there are certain guidelines as to which programs are to be used. Guidelines are based on programs used in evidence-based practice in which researchers which have produced overwhelming success in the therapy process when working with several different individuals diagnosed with autism (Dugger, 2012).

Faced with the difficulties of autism, parents are understandably desperate for guidance and hope, and turn to policy makers for advice as to which approaches to use. Unfortunately, in our country there are no guidelines, nor model policies. Cumulative effectiveness research then has to be the best guide – even though this can seem slow when definite help is needed immediately. The pace of research into treatments is quickening but in comparison with many other areas of health is at an early stage, even in western countries.

Over the years, there have been many treatments developed for children with autism, evolving from different philosophies. These include behavioral interventions, developmental interventions, and cognitive behavioral interventions. While each program is based on a different philosophy and uses unique intervention strategies, there is also considerable overlap in components of the programs (Corselo, 2005).

Evidence based comprehensive treatments for autism were introduced by Lovaas who published papers describing the "recovery" of almost 50% of a group of very young children with autism, treated intensively with applied behavioral analysis for several years (Lovaas, 1987; Lovaas, 1993).

These papers suggested an entirely new way of thinking about autism: as a disorder marked by considerable plasticity, for which there is some hope of recovery given appropriate intervention. The papers have had tremendous impact on public schools and other public service agencies that fund interventions for all children with disabilities, resulting in the development of specialized intervention programs for children with autism that differ markedly for those of children with other developmental disorders. The papers also had a tremendous effect on thousands of parents, who hope to achieve a similar recovery for their own children. Macedonian parents have little knowledge about these early intervention programs. Many parents have spent large amounts of their own money purchasing the interventions and hundreds to thousands of hours of their own time mobilizing services and funding for their children's interventions, including many hearings and court cases.

Practitioners involved in early intervention for infants and toddlers with ASD and their families, have been limited by the relative scarcity of information on evidence-based practices. Nevertheless, researchers have been diligently working to establish the research base as a guide for selecting appropriate intervention strategies. There is scientific evidence from research with pre-school children with ASD about the efficacy of many focused intervention practices (Odom et al., 2007).

Strategies and tactics employed with older pre-school children with ASD may be promising for use with younger children with ASD. Service providers should use their professional wisdom in selecting practices found to be effective for older children with ASD and then determine if those procedures adequately address the needs of infants and toddlers and comport with the values of families (Buysse & Wesley, 2006).

As additional intervention practices and models for infants and toddlers with ASD emerge, two fundamental considerations will be (a) the validation and replication of the efficacy of focused intervention practices and CTMs for infants and toddlers with ASD and (b) validation and dissemination of models of professional development that will support the implementation of evidence-based interventions by service providers and families (Boyd et al., 2010).

The field of autism early intervention has changed in the last 20-30 years. Since the development of the first empirically-validated and highly-structured ABA interventions that changed the lives of children with autism, continued research has expanded these efforts by moving towards more naturalistic interventions that integrate principles identified by developmental science with ABA principles. Whereas behavioral and developmental research and treatment in ASD initially proceeded separately, the increasing emphasis and evidence on autism intervention during the early childhood period have brought these fields together. These Naturalistic Developmental Behavioral Interventions represent the integration of ABA and developmental science and they not only allow us to achieve more substantial and accelerated child learning and behavior change, but they are particularly well suited to the infant and toddler autism population now being served (Schreibman et al., 2015).

Macedonian pediatricians, psychologists and rehabilitators lack the skills to conduct such early kinds of treatments.

In Republic of Macedonia there is no systematic approach to early intervention services and programs. There are no service providers for the early intervention of children with ASD. Parents access various kinds of treatments for their children, the most popular are: training of social skills, psychomotor re-education, biomedical treatment and treatment with medicaments. Sometimes they use unproven treatments which can be dangerous for the health. The use of ABA and TEACCH is at an incidental level.

One of our previous epidemiological studies showed that data for children with ASD is inconsistent in the centers for social welfare and in the medical centers. The complexities in diagnosis, making of procedures, insufficient information of the population, absence of a legislative registration and National Register for Autism, are all part of tasks for a team of professionals who must work on this problem (Trajkovski et al., 2005).

The Macedonian Scientific Society for Autism (an organisation run by professionals set up in the year 2000) provides free education about autism and specific approaches, such as PECS, TEACCH and Re-Attach method. The Association also participates in EU funded projects developing parent and professional education. Family counselling and psycho-social support by state institutions is very poorly developed.

A lot of parents are turning to alternative and complementary medicine treatments such as: homeopathy, gluten and casein free diet, CD autism protocol, cannabis oil, DAN treatment and stem cells treatment, all searching for a way to improve the recovery of their children. Some of the parents do not accept medical therapy for children with autism. A lot of children are hyperactive, aggressive and auto-aggressive, and parents have to live with these behaviors.

There is no effective law in Republic of Macedonia for early intervention practices. Also for education in schools, there is no legislation to guide and support parents into choosing the type of school to send their children to. Great numbers of parents send their children to mainstream schools with a 1:1 specialist assistant who is financed by the parents. Having a child with autism spectrum disorders in Macedonia can have a huge financial impact for the family. It appears that policy makers are not interested in this area and have no understanding of the problems families face who take care of children with autism.

Authorities have to start with certificated programs for training the professionals. Almost half of parents are not satisfied with early intervention programs in our country. One third of parents spend between 250-350 Euros on early treatment which is a significant amount of their own budget.

In developed countries most of the empirical studies have been conducted on ABA interventions. While there is evidence that certain strategies can be effective for teaching specific skills to children with autism, there is not currently evidence that one program is better than any other. Despite this difficult situation with early intervention in Macedonia, western world countries have very good evidence-based systems for a number of years.

There are two classifications of practice: focused intervention practices and comprehensive treatment models. Focused intervention practices are specific teaching procedures that practitioners or parents use to promote children's learning and development or decrease challenging behaviors. Early intervention service providers select specific focused intervention practices to address individual goals and objectives for infants and toddlers as well as their families. In comparison, comprehensive treatment models (CTMs) are conceptually organized and multicomponent practices that have been integrated in a comprehensive manner (e.g. across developmental domains, across longer periods, across the employment of a variety of focused practices) to promote positive outcomes for children with ASD (Boyd et al., 2010).

There have been two basic assumptions about services for children with ASD: firstly, that early intervention service providers use research as a guide for selecting focused intervention practices or CTMs for infants and children with ASD and their families (Odom et al., 2007); secondly, that practitioners use their professional judgment about context and values (their own and those of the family) in the application of such practices (Buysse & Wesley, 2006). Efficacy research that includes infants and toddlers with ASD has been relatively limited.

Focused intervention practices consist of: Behavioral intervention strategies, Positive behavior support, Naturalistic interventions, Parent-implemented interventions, Picture exchange communication systems, Pivotal response training, Structured work systems, Visual supports (Boyd et al., 2010).

Comprehensive Treatment Models (CTMs) differ from focused interventions in scope, intensity, and complexity. CTMs consist of multiple focused intervention practices organized around a conceptual framework; they address multiple developmental areas or core behavioral features of ASD. They are implemented over extended periods (e.g., a year or more). These models varied by conceptual and theoretical frameworks as well as by quality of development and empirical support. Model developers who were affiliated with 20 of the 30 models reported their appropriateness for children below the age of 3. However, some CTMs were specifically designed for infants and toddlers with ASD, or those models were explicitly adapted from the original CTMs for older children. In this group following methods are included: Children's Toddler School, Project Data for Toddlers, Early Start Denver Model, Early Social Interaction Project, Walden Toddler Program (Boyd et al., 2010).

Parent involvement is crucial in implementing strategies and new techniques into the daily lives of children with autism. The amount of parent involvement could possibly be the most important of all strategies to allow for carry over. The reason for this is because it allows for more family support due to the focus of the caregiver's needs. By allowing this, caregivers are able to understand how to teach their child while also being able to reduce challenging behaviors that might be exhibited (Moes & Frea, 2002).

When family involvement is mentioned as an approach used in early intervention, there are many different things that can happen. It can be as simple as the family implementing what the child is learning during direct therapy hours into everyday living situations, but it can also be direct interventions programs that parents learn how to implement during therapy. This could include the Early Social Interaction program which is a "parent-implemented intervention model designed to individualize social communication goals and monitor child progress, to identify family routines for targeted goals, to teach parents to implement teaching strategies within selected everyday routines, and to support family implementation of intervention" (Wetherby & Woods, 2006).

By allowing for a strong family-professional partnership, confidence is gained, paired with a sense of empowerment with in family members or caregivers. Results of parental empowerment are increased in the likelihood that the caregiver will communicate with professionals about concerns. Family and caregivers will also feel comfortable in continuing to incorporate newly learned skill with their child (Dugger, 2012).

Legislators and researchers are currently emphasizing the delivery of research-based practices in many areas, including autism services. Therefore, it is critically important to examine the attitudes and experiences of service providers in community-based settings. Although many service providers reported being supportive of the use of evidence-based techniques, most did not have a good understanding of what the research was saying in the area of autism. Most of the providers reported using at least one evidence-based technique; however, these same providers were just as likely to report using poorly researched techniques as well. These findings provide insight into recommendations for successful translation of research based practices into EI programs for children with autism. Pragmatic issues regarding the use of the techniques in classroom settings must be addressed. Validity concerns when techniques are combined or modified should also be examined. In addition, adoption of any new intervention is likely to be facilitated by increased marketing to both community agencies and family members, access to low-cost training, and methods for use in group teaching situations (Stahmer, Collings & Palinkas, 2005).

Over the last two decades, research and public policy efforts for children with ASD and their families have focused on early warning signs of the disorder and on the earlier identification of young children with ASD (Johnson & Myers, 2007; Osterling & Dawson, 1994). As policy and practice recommendations to improve early screening and assessment of ASD have been implemented across the country, personnel in EI programs have been challenged to provide evidenced-based services for very young children with ASD. Moreover, parents have been confronted with the issue of how best to access the service delivery system for young children with ASD. Currently in the USA, intervention services for infants, toddlers, and preschoolers with ASD and their families have been accessed through different funding streams, including the federal and state government (Boyd et al., 2010).

The lifetime cost of autism spectrum disorder in the UK has been estimated at £3-4.6 million per individual, with a likely financial burden of between £5 billion and £30 billion (McClure and Couteur, 2007). There is some evidence that interventions that are effective in addressing conduct disorder may also have some efficacy for children with, or at risk of, autism spectrum disorder. Social and communication impairments are especially critical (Woods and Wetherby, 2003).

This amount of money sounds fantastic and it is unrealistic to expect spending at a similar level by governments of any low-income Balkan country.

The hope of many professionals and advocates is that earlier identification and assessment of ASD will lead to effective early intervention, which at present includes both behavioral and developmentally based treatments (Landa, 2008). With access to high-quality interventions in the infant and toddler years, the possibility exists for the prevention of autism (Dawson, 2008) or at least a reduction in the severity of children's symptoms over the lifespan because of the malleability of the brain during this critical period of development.

CONCLUSIONS

There are many strategies for working with children with ASD and not all of them are equally known or available to all parents. Most of the empirical studies have been conducted on ABA interventions. While there is evidence that certain strategies can be effective for teaching specific skills to children with autism, there is not currently evidence that one program is better than any other.

The available evidence from a variety of programs and studies suggests that EI leads to better outcomes. A number of studies have demonstrated that children make greater gains when they enter a program at a younger age. It is important to keep in mind that most of the empirical support for the difference in gains is comparing children younger than 4 or 5 years to children older than 4–5 years of age. The pre-school years are still considered "early" when it comes to early intervention.

In Republic of Macedonia there is no systematic approach to early intervention services and programs. Policy makers have to start with certificated programs for training the professionals. The government should allocate more financial resources to this sector.

There is a great deal of interest in the common elements of the programs when making recommendations, including parent involvement, intensity, a predictable environment, incorporating the child's interests, actively engaging the child and focusing on individualized developmental goals. It is important that professionals and parents are informed about the progress they can expect for their child, as well as remain aware that most research does not support a "cure" or "recovery" from autism.

It is essential for researchers to continue to validate effective and efficient interventions, for practitioners to strive to co-ordinate and integrate effective day-to-day services, and for policy makers to implement adequate, well-coordinated and well-integrated service delivery systems; if optimal outcomes for infants and toddlers with ASD and their families are our ultimate goal.

The authorities need to begin to see this disorder as treatable, and to invest the same energy, money, and efforts into treating autism that we have put into treating cystic fibrosis, leukemia, childhood cancers and other chronic medical disorders that affect young children.

Future research should lead to interventions that are even more effective, efficient and individualized. Better understanding of the active ingredients of these interventions, fidelity of implementation needed for good outcomes in both research and community settings and the components that have the strongest effect on outcomes for sub-groups of children are critical research goals as the next generation of studies is designed.

Conflict of interest

Authors declare no conflict of interests.

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MONITORING OF EARLY DEVELOPMENT OF CHILDREN AGED 0 TO 24 MONTHS IN TUZLA CANTON

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SUMMARY

The importance of early child development for the creation of a grown person and ways of dealing with the demands placed before that person through the life is elaborated in a number of surveys conducted in our society and in the world. The main objective of this study was to provide speech and language, sensory-motor and socio-emotional development of children aged 0-24 months. The survey was conducted in six municipalities of Tuzla Canton. The total sample consisted of 181 respondents. For the purpose of research Screening Instrument, designed to detect and monitor speech and language, sensorimotor and socio-emotional development of children from 0-24 months, was conducted. The results showed that with the increase in chronological age of the children, parents' responses to the questionnaires were increasingly uneven. This may indicate a certain deviation in the development of children, or the lack of stimulation from the primary environment in which the child develops which points to the importance of work with parents in this early period of child development.

Key words: child development, screening, parents

INTRODUCTION

The importance of first childhood years for health, well-being and coping mechanisms in adulthood has been proven by numerous studies (Bratovčić Junuzović-Žunić, Teskeredžić, Šarić, Mehmedinović & Dizdarević, 2016). In practice it appears that childs'searly development has the attention that it deserves, but unfortunately, only when the child's behavior does not fit the norms and requirements of the environment. The child then enters the system of assessment, evaluation and many interventions that seek to determine what it is that the child needs in order to meet those needs and to assess whether the implemented intervention resulted in expected changes in the behavior. The purpose of early intervention is to prevent or reduce the effects of disability or delays in development, and services are designed to meet the individual needs of children in all developmental areas: motor, perceptual-cognitive, speech and language, social-emotional and in the area of independence in activities of everyday life (Anonymous, 2015). In addition to children, important factors in the process of early intervention are parents, brothers and sisters because the family is the primary environment in which the child grows and develops. The family provides the appropriate climate, helping to overcome the emotional crisis, clarifies the role of family members in the process of education and habilitation of children with developmental disabilities. It's important to point out to the parents that the work with the child in the parental home is an essential complement to rehabilitation (Joković-Turalija & Pajca, 1999). Although the family creates a natural environment for the development of communication, it can also create the factors that pose a risk for the development of, for example, communication disorders (Gerber, 1998).

It should be noted that the early age is exactly the period when there is a unique opportunity to influence the child's development, but also to offer the support to the family. In this way we can achieve the greatest benefit for all involved. In this regard, most experts, parents and policy makers agree that the implementation of early intervention for children with developmental difficulties and risks, is the social responsibility (Ljubešić, 2012).

METHODS

The sample

The survey was conducted on a sample of 211 participants, however due to the lack of answers to certain variables, the total sample consisted of 181 participants. The questionnaire was filled by 85.8% of mothers, 11% of fathers and 6% "other." The survey was conducted in the area of Tuzla Canton six municipalities: Banovici, Kladanj, Kalesija, Gracanica, Tuzla, and Zivinice.

THE MEASURING INSTRUMENT

For the purpose of research screening instrument was designed to detect and monitor speech and language development, sensory-motor and socio-emotional development of children ages 0-60 months (Bratovčić et al., 2016). For the purposes of this study, we used the screening instrument for children ages 0-24 months. Screening instrument was filled by parents and we analyzed the variables that describe the motor, speech and language, cognitive and sensory development.

METHODS OF DATA PROCESSING

For data analysis we used descriptive statistics. The calculated frequencies and percentages, and obtained results are presented using tables and graphs. Survey data has been processed using the statistical package SPSS 20 for Windows.

RESULTS

The results in Table 1 show that at the age of 0-2 months (N = 35), the highest percentage of children 91.4% react to sudden noises and sounds, 82.9% raise their heads when placed on their bellies, 80% stop crying when somebody approaches them and starts talking to them. Out of 35 children ages 0-2 months included in this study, 17.1% of do not vocalize or play with speech organs, while 14.3% of children are not able to visually track a toy that moves horizontally.

Table 1 *Development of children aged 0 to 2 months*

Variables	No	Occasionally	Yes
Reacts to sudden noise	8.6%	-	91.4%
Vocalizes / intonates vowels	17.1%	8.6%	74.3%
Effectively sucks/swallows when breastfeeding	-	-	100%
Raises head when placed on belly	14.3%	2.9%	82.9%
Grasps a finger pressed against his/her palm	-	-	100%
Visually tracks a horizontally moving toy	14.3%	11.4%	74.3%
Ceases to cry when someone approaches and starts talking to him/her	11.4%	8.6%	80%

All children ages 2 to 4 months (N = 24) react to examiner's smile, while 91.7% bring their hand to the mouth. When somebody talks to them, 87.5% of children make baby sounds and 85.2% turn toward the source of the sound/speech. 50% of children surveyed do not hold the toy (Table 2).

Table 2 *Development of children aged 2 to 4 months*

Variables	No	Occasionally	Yes
Smiles when examiner smiles at him/her	-	-	100%
Makes cooing sounds when spoken to	-	12.5%	87.5%
Turns toward the sound/speech	-	3.7%	85.2%
Brings hand to mouth	4.2%	4.2%	91.7%
Grabs and pulls a diaper	12.5%	12.5%	75%
Reaches for the toy with one hand	12.5%	16.7%	70.8%
Reaches for the toy with one hand	50%	12.5%	37.5%
Makes grasping motions when lying on his/her back	-	8.3%	91.7%

23 children, ages 4 to 6 months (N = 23), 95.7% turn towards the person who speaks, recognize their mother, smile at her, and reach out to take the toy. 26.1% of children occasionally smile at their reflection in the mirror, while 13% do not (Table 3).

Table 3 *Development of children aged 4 to 6 months*

Variables	No	Occasionally	Yes
Turns toward a person who speaks	-	4.3%	95.7%
Recognizes his/her mother and smiles at her	-	4.3%	95.7%
Smiles at his/her reflection in a mirror	13%	26.1%	60.9%
Grabs his feet	4.3%	8.7%	87%
Grasps for a toy	-	4.3%	95.7%
Begins to sit with support for a short time	4.3%	8.7%	87%
Bears weight on legs when held upright	-	-	100%
Connects a vowel and a consonant: ba, ta, da	8.7%	17.4%	73.9%

Results in Table 4 show that at ages of 6 to8 months (N=11), 90.9% of children separate syllables ba-ba-ta, look for an object that has fallen, move a toy from one hand to the other and respond when called by name. Total of 54.5% of children do not separate an index finger, while two children do not touch their reflection in the mirror and two children do not understand the “no-no”.

Table 4 *Development of children aged 6 to 8 months*

Varables	No	Occasionally	Yes
Connecting syllables: ba-ba-ta	9.1%	-	90.9%
Plays by throwing an object on the floor or hitting two objects together	-	-	100%
Visually searches for a dropped object	-	9.1%	90.9%
Passes a toy from one had to another	-	9.1%	90.9%
Searches for hidden objects	9.1%	9.1%	81.8%
Understands no-no	18.2%	36.4%	45.5%
Sits	-	27.3%	72.7%
Responds when called by name	-	9.1%	90.9%
Eats solid foods from a spoon	-	18.2%	81.8%
Separates an index finger	54.5%	9.1%	36.4%
Touches his/her reflection in a mirror	18.2%	9.1%	72.7%

At ages 8 to 12 months (N = 18), 72.2% of children raise themselves into a standing position and can stand, 83.3% imitate pressing a doll that produces a sound, while 77.8% point in the direction of desired object. 22.2% of children do not sit up and cannot stand and the same percentages do not try to walk while somebody is holding them under armpits. There is a large percentage of children who can not show “where the bunny drinks water” and 55.6% were not able to reproduce the onomatopoeia (Table 5)

Table 5 *Development of children ages 8 to 12 months*

Variables	No	Occasionally	Yes
Raises into a standing position and can stand upright	22.2%	5.6%	72.2%
Makes stepping motion when held under arms	22.2%	11.1%	66.7%
Imitates pressing a doll that makes sound	5.6%	11.1%	83.3%
Shows body parts	64.7%	-	35.3%
Can clap hands	5.6%	16.7%	77.8%
Can wave goodbye	23.5%	11.8%	64.7%
Reproduced animal sounds (woof-woof, meow, etc.)	55.6%	22.2%	22.2%
Understands simple orders (e.g. give, where is)	16.7%	16.7%	66.7%
Points a finger at desired object	16.7%	5.6%	77.8%

At the ages 12 to 18 months (N = 40), 97.5% of children understand simple orders (give me, come on, let`s go) and use the index finger to show what they want, but also to draw the attention of parents. 92.5% of children push the ball and the same percentage approaches other children. 12.5% of children do not walk by themselves and 10% of children doodle when given paper to draw on (Table 6).

Table 6 *Development of children ages 12 to 18 months*

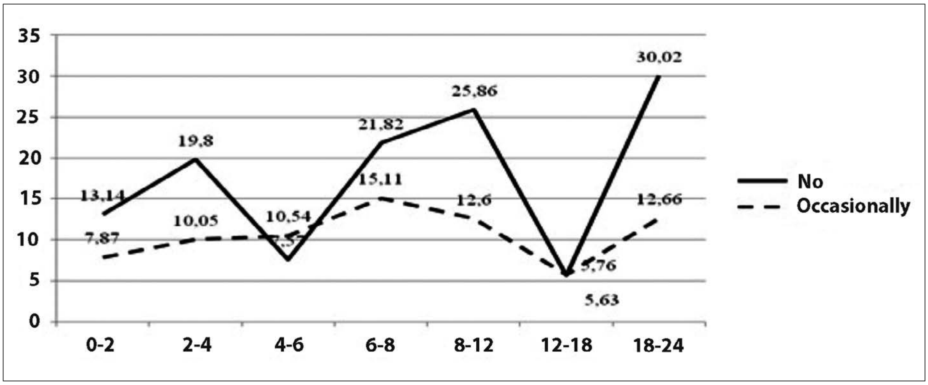
Variables	No	Occasionally	Yes
Understands simple orders (e.g. give, come, let’s go)	-	2.5%	97.5%
Knows objects/body parts and points to the on demand	7.5%	5%	87.5%
Uses index finger to point to what he/she wants and to draw parents’ attention	-	2.5%	97.5%
Walks independently	12.5%	7.5%	80%
Climbs stairs with help	2.5%	7.5%	90%
Pushes a ball with foot	2.5%	5%	92.5%
Doodles when given a piece of paper	10%	7.5%	82.5%
Approaches other children	2.5%	5%	92.5%
Imitates others people activities	5%	10%	85%
Takes off socks, shoes, hat	2.6%	5.1%	92.3%

Table 7 shows the results for children ages 18 to 24 months (N = 30) showing that 50% of children ask for potty, while 40% do not, 10% of children sometimes ask for potty. 93.3% of children can kick a ball, while 73.3% of children can leaf through a children's book by themselves, and 70% of children can form simple sentences to get what they want.

Table 7 *Development of children ages 18 to 24 months*

Variables	No	Occasionally	Yes
Asks for potty	40%	10%	50%
Can kick a ball	-	6.7%	93.3
Makes a simple sentence to get what he/she wants (e.g. give juice, want to eat, go home)	16.7%	13.3%	70%
Can turn pages in a children's book unassisted and asks parent for assistance	16.7%	10%	73.3%
Can finish sentences in familiar stories (e.g. Little Red Riding Hood visited her...(Grandma))	46.7%	23.3%	30%

Graph 1 shows distribution of answers given by parents according to the age and development of their children. It shows the summary distribution of the offered answers "No" and "Occasionally", with the aim of insight into the dispersion of responses. The results in the chart show that 13.4% and 7.7% of parents responded that children do not show and occasionally show some of the behaviors provided for ages 0-2 months. The results showed that with the increase in chronological age of the child, parents' responses to the questionnaires were more uneven, and so, at the age of 18 to 24 months, 12.66% and 30.02% of them said that children do not show and only occasionally exhibit some of the behavior advised for that age group.



Graph 1 Distribution of answers given by parents according to child's age

DISCUSSION

The period from birth until two years of age is crucial for detecting and acting upon the development of the child's abilities. Results of this study indicate that the majority of children aged from their birth to the end of the second year of their life exhibit, as reported by their parents, behaviors that are typical for that period of development.

However, there is a certain percentage of parents (between 13% and 30%), which state that appropriate behavior is not manifested by their children. Results showed that with the increase in chronological age of the child, parents' responses to the questionnaires, were more uneven for a number of observed variables, i.e. parents are more likely to answer with "occasionally" and "not". The reason for this may be because of the individual development of children and the fact that certain behavior may not happen in all children at the same age. However, taking into account that the disparity in responses is especially pronounced in those variables that relate to the child's behavior which can be induced only through the interaction of children with adults, as well as by bringing a child into the situation to manipulate objects and toys in the environment, the results also point to the fact that contemporary fast-paces life style and today's society leave parents with less time to devote to their children, to actively participate in the observation and encouragement of their development.

Most experts agree that effective stimulation in early childhood has many positive long term impacts on the society as a whole (Anonymous, 2015). Learning hugely depends on the outside stimulation, as well as the disposition that child brings into the world (Ilankovic & Ilankovic, 2001).

Early detection and early intervention programs, in addition to being created for children, should also be created for parents. The reason why intervention should focus on parents is the fact that they, especially mothers, are the ones who spend most time with the child. It is a mother that, in most cases, first notices certain signs of deviations in the development of their children (Bratovčić, Saric & Mujanovic, 2011). In addition, bond between a mother and a child is usually the quietest, but also most powerful bond of social support for the child (Bricker & Schiefelbusch, 1990). The child's attachment to the parent can clearly be seen for the first time at the age of six to eight months. However, the actual process of attachment begins immediately after birth, and it gets stronger and continues as the child grows (Marvin & Britner, 1999).

What the child's conditions to achieve the maximum in mental and physical development will be will depend on their immediate and wider environment. Preventive character through early intervention helps parents to learn to cope with the challenges and risks of unpredictable development of the child, and on the other hand, provides the child everything he/she needs, namely developmentally appropriate stimulation, unconditional acceptance, and parental support. This approach prevents potential developmental delays, excessive depletion of parents and their social isolation.

Therefore, early intervention in its modern form focuses on the child and his/her features, as well as the parents and their needs. Deviations from the normal development vary. Parents' reactions to the same deviations are also different, and early intervention consists of different services which should be coordinated in order to enable the best development of the child as well as provide parents with a sense of security in dealing with the newly arisen circumstances (Racki, 1997).

During the early intervention with the child, stimulation is being provided through shared, reciprocal games. Through play the child gains experience and gains functions by participating in basic game sequences. The interaction can include various activities such as smiling, vocalizing, touching, reaching, gestures, or manipulation of objects. The game should be enjoyable, and it should stimulate interest and attention of the child. Care must be taken when selecting activities carried out within a certain period, best done when child is awake, and the game should permeate all daily activities. For example, a good a period is when changing a baby, after feeding a child, when a child is relaxed and its attention span highest (Bricker & Schiefelbusch, 1990). It is believed that early interactions are invaluable. Early interaction with the child forms the basis for a good upcoming cognitive, socio-emotional and linguistic development of the child (Ivšac, 2003).

Children exposed to development risk factors, though with no visible damage, require intensive and continuous observation, due to potential risk of deviation from normal development as well as certain preventive measures, before the functional deficit occurs (Nikolić, Ilić Stošović & Ilić, 2010). Observation, prevention and early intervention is achieved through the development of counseling centers which provide a venue where parents of all children, those with typical as well as atypical development, can and should get the information, advice and training in order to monitor, encourage and guide the development of their children through play and daily activities.

CONCLUSION

In many families there is a lack of communication and appropriate play with children at the earliest age, because the parents feel that the child is still small and does not understand the language, does not know how to play etc. Parents should be encouraged and empowered to engage their children in a variety of activities, tell them stories, show them picture in picture books, sing songs and rhymes, encourage them to jump, overcome obstacles and orient in space and time. Also, parents should be educated and encouraged to surround children with a variety of toys and objects, to show them how they are used, regardless of the fact that the child is still small, because only in this way, through communication and interaction, children learn to speak properly, to move, to manipulate objects and to take care of themselves. Interactive games, through which the child learns about the world around them, are very important for a child's overall development. It is important that such stimulation starts at an early age. If the child already exhibits certain delays in the development or difficulties in overcoming specific developmental skills, it's not enough to take a child development expert and think that he will solve the problem. Experts will help the child and the parent to determine and direct treatment, but without the active participation of parents in the treatment of his child, progress will be minor and both children and parents will be faced with increasing difficulty as the child grows and as the societal expectations from children increase as well.

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EARLY INTERVENTION IN VOCATIONAL REHABILITATION OF PERSONS WITH ACQUIRED DISABILITIES

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SUMMARY

There are many scenarios that can lead to disabilities and its manifestation can have a large number of varieties including the type of disability, the degree of visibility of the disability, course of the condition and experience of pain and other symptoms. Acquiring a disability is extremely difficult experience and person sudden exists in different world comparing with ones before acquiring disability. Changes can occur in physical, mental, social, vocational and family functioning. Rehabilitation often begins in the hospital setting. The goals of rehabilitation are to help persons with acquired disabilities achieve maximum functional independence as much as possible and to attain the best possible quality of life and life satisfaction.

In this article is discussed importance of early intervention in vocational rehabilitation. Evidence suggest that early intervention in vocational rehabilitation is more effective than late. Early intervention strategies lead to faster return to work. The timing of the interventions play a key role in returning to vocational activities. Recent researches have showed that early rehabilitation is more associated with factors that usually predict better health and better job satisfaction, such as a permanent job, high occupational status, good job control, low job insecurity, and healthy lifestyle.

Key words: early intervention, vocational rehabilitation, acquired disability, return to work

INTRODUCTION

Increasing of industrialization and motorization have led to increasing the number of accidents occur at work and in the traffic. The most injuries that happen are traumatic brain injury, spinal cord injuries, upper and lower extremities injuries.

Survive of victims of severe accident is increased due to the development of medicine. Rehabilitation process is aimed at enabling persons with acquired disability to reach and maintain their optimal physical, sensory, intellectual, psychological and social functional levels. Rehabilitation provides disabled people with the tools they need to attain independence and self-determination. Additional, this group of people represent group with specific problems in terms of reintegration into society, school or work.

Keeping employees at work and helping them get back to work as soon as possible after an absence can help maintain their health and wellbeing while also maximising productivity. The economic costs of absence from work are an important reason for undertaking various measures that employees who acquired disabilities return to work as soon as possible. Estimates suggest that the costs of injuries total tens or even hundreds of billions of dollars per year (Leigh et al., 2000). The costs associated with workplace injuries can be substantial for both injured workers and employers. Workers suffer both economic and noneconomic hardships that can persist for years. Employers must pay medical and indemnity benefits, lose worker productivity, and often bear the costs of replacing the lost worker. Furthermore, costs of absence from work have significant impact to persons and their family related to less physical, social and psychological well-being (Hammell, 2007; Krause et al., 2001; McKee-Ryanet al., 2005).

Vocational rehabilitation represents integral part of national strategies for minimizing absence from work, disabling, employment and enabling. Vocational rehabilitation have economical rationale. In the case when it is not possible, vocational rehabilitation have to be therapeutic provision focused to social rehabilitation (Odović, 2005).

Injury outcomes are different and require team work. Experts must have basic knowledge related to injury consequences, necessary rehabilitation provision and other kind of help adapted to time and stages of injuries.

1. Professional rehabilitation

Chan et al. (1997) defined vocational rehabilitation as:

"a dynamic process consisting of a series actions and activities that follow a logical, sequential progression of services related to the total needs of a person with a disability. The process begins with the initial case finding or referral, and ends with the successful placement of the individual in employment. Many activities and developments occur concurrently and in overlapping time frames during this process" (p. 312).

Some authors deem that there are changes in understanding of effective rehabilitation achieving and workplace was recognised as key factor of employee recovery. Because of that rehabilitation should be focused on tasks required by work with appropriate treatment and activities that encourage restoration of work – related functions. In that sense Hanson et al. (2006) deem that vocational rehabilitation includes multidimensional methods for attainment of work or return to work as outcome for employees with injury or illness which have led to out of work. These methods include workplace intervention.

Verbeek (2006) believes that vocational rehabilitation can be an old term for what today would be called return to work after an illness or injury, or as a work (re) integration for workers with limitations in performing activities.

The primary goal of vocational rehabilitation is to assist individuals with disabilities gain or regain their independence through employment or some form of meaningful activity and reintegration into society (Parker & Szymanski, 2003).

The final goals are:

- preventing potential disability;
- returning workers with disabilities to gainful employment;
- introducing individuals with disabilities into the labor force; and
- keeping workers with illness and disabilities employed (Jenkins, Patterson & Szymanski, 1998).

Vocational rehabilitation includes services for facilitating and supporting the return to work. Lee (2010) stated that typical services include:

- vocational assessment and evaluation,
- vocational training,

- general skills upgrading,
- refresher courses,
- career counselling,
- on-the-job training program,
- job search, and
- consultation with employers for job accommodation and modification.

These service delivery processes are not the same for people with certain disabilities and may vary depending on the needs of the person. It is necessary to take into account personal, educational, and environmental factors during the process (Lee, 2010).

Vocational rehabilitation principles and interventions are fundamentally the same for work related and other comparable health conditions, irrespective of whether they are classified as injury or disease. The guiding principles of quality vocational rehabilitation[a] are:

1. Vocational rehabilitation should be initiated without delay and proceed in conjunction with medical treatment and physical rehabilitation to restore the worker's capabilities as soon as possible.
2. Reasonably necessary vocational rehabilitation assistance will be provided to overcome the immediate and long-term vocational impact of the compensable injury, occupational disease or fatality.
3. Successful vocational rehabilitation requires that workers be motivated to take an active interest and initiative in their own rehabilitation. Vocational programs and services should, therefore, be offered and sustained in direct response to the commitment and determination of workers to re-establish themselves.
4. Maximum success in vocational rehabilitation requires that different approaches be used in response to the unique needs of each individual.
5. Vocational rehabilitation is a collaborative process, which requires the involvement and commitment of all concerned participants.
6. Effective vocational rehabilitation recognizes, within reason, workers' personal preferences and their accountability for independent vocational choices and outcomes.
7. The gravity of the injury and residual disability is a relevant factor in determining the nature and extent of the vocational rehabilitation assistance provided.
8. Where the worker is suffering from a compensable injury or disease together with some other impediment to a return to work, rehabilitation assistance may sometimes be needed and provided to address the combined problems. Rehabilitation assistance should not be initiated or continued when the primary obstacle to a return to work is noncompensable.

Healthcare has a key role in rehabilitation of persons with acquired disabilities, but the evidence shows that treatment by itself has little impact on work outcomes. Generally, effective vocational rehabilitation depends of healthcare focused on work and adaptation of workplace. Vocational rehabilitation should be an integral

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[a] Vocational rehabilitation, Chapter 11, Rehabilitation Services and Claims Manual Volume II. Retrieved from http://www.worksafebc.com/publications/policy_manuals/rehabilitation_services_and_claims_manual/volume_ii/default.asp

part of healthcare and workplace interventions and is not necessarily second-stage intervention (Waddell, Burton & Kendall, 2008).

The concept of early intervention is central to vocational rehabilitation. If person is the longer off work vocational rehabilitation becomes more difficult and the obstacles to return to work are greater. It is simpler, more effective and cost-effective to prevent long-term sickness absence. In that sense Waddell, Burton & Kendall (2008) stated a 'stepped-care approach' which starts with simple, low-intensity, low-cost interventions which will be adequate for most sick or injured workers, and provides progressively more intensive and structured interventions for those who need additional help to return to work. This approach allocates finite resources most appropriately and efficiently to meet individual needs. Effective vocational rehabilitation depends on communication and coordination between the key players – the individual, healthcare, and the workplace.

2. Acquired disability

There are many scenarios that can lead to disability and each of them can, but doesn't have to, refer to types or work condition in which person is involved. As illustration, it should be stated:

- progressive illness or condition which lead to long – term absence from work, for example, arthritis, progressive eye-sight loss, diabetes, asthma, cancer, back pain and other conditions;
- sudden onset of the disease or condition which lead to long – term absence from work for example, heart attack or pneumonia, or
- traumatic accident or event that lead to illness, injury or impairment that requires surgery and therapy and is therefore related to the long-term absence from work; events that lead to this are sport recreation, traffic accidents and workplace – related accidents.

In general terms, there are many ways that can lead to disability during life and its manifestation can have a large number of varieties including the types of disabilities (sensory, motor, or cognitive), the degree of visibility of the disability, course of the condition (constant, relapsing, or progressive) and the *experience* of pain or other symptoms.

Acquiring a disability is extremely difficult experience which leads to life-changing. Person sudden exists in different world comparing with ones before acquiring a disability.

Disability places a set of extra demands or challenges on the family system. Many of these challenges cut across disability type, age of the person with the disability, and type of family in which the person lives. Family life is changed, often in major ways. Care-taking responsibilities may lead to changed or abandoned career plans. Family perceived greater financial stress, frequent disruption of family routine and leisure and social roles are disrupted because often there is not enough time, money, or energy to devote to them (Singhi et al., 1990).

The chain of psychological reactions starts with acquisition of disability and represents special case of coping with traumatic event in life (Livneh, 2001). Depending of nature of acquired disability, person's life may be changed on a way that she/he early could not imagine. This new way of existence, this new culture is suprising and represents big challenge. Possible pain and rehabilitation should be added to this.

Adjustment to acquired disabilities were defined as personal and high individualized response on disability or disorders due to illness in wide range of life domains (Bishop & Allen, 2003). These disorders may be experienced, for example, in interpersonal relationships, in interaction with physical environment and as changes in psychological or emotional health and function.

In the early stages of adaptation, the changes that happen in person`s life and families may seem tolerable–at least while person still think there is a chance that the diagnosis is wrong. Feelings move from anger to depression rather than progress through one stage and into the next. Depression often occurs during the adaptation process, and may happen at other times or continue. The initial period of adjustment after a disability or illness almost always requires going through each of the stages. It can take a long time for some to arrive at adaptation, and not everyone in a family gets there at the same time. With a lot of support, good communication, and teamwork, the process will likely resolve in time for most people.

Livneh and Antonak (1997) define psychosocial adaptation to chronic illness and disability as the final phase of an adaptation process during which the individual achieves a state of reintegration, positive striving to reach life goals, positive self-esteem and demonstrating positive attitudes toward oneself, others and disability.

Psychological adjustment to acquired disabilities has been viewed in the literature as a sequential process involving three to five naturally occurring stages (Bracken, Shepard & Webb, 1981; Stewart, 1977). Stage theories often suggest that psychological difficulties are a natural response when persons undergo grieving processes. In that sense, Stewart (1977) proposed a three-stage model of coping and adaptation that included (a) denial, (b) depression, and (c) moratorium/restitution (a stage typically marked by some form of acceptance of the disability). Stage models assume a linear process following a discrete event. However, disability is an experience that may be lifelong, that may arise suddenly, or may have a gradual onset, or that may gradually intensify. More holistic approaches would be helpful, as are models that place a decreased emphasis on the assumption of the necessity of grief and depression as the critical psychological phenomena that define well-being in disability. Finally, as long as adjustment to the disability remains the focus of this area of work, it may be difficult to shift from a preoccupation with persons with disabilities as differing from and therefore worse off than nondisabled persons, but actively seeking to re-approach their pre-disablement functioning.

It is clear that adaptation to disability is a complex process depending on many parameters, which determine whether or not an individual will accept his/her disability and socially re-integrate, negotiating his/her new identity and roles in personal and social level (Psarra & Kleftaras, 2013).

3. Early intervention in vocational rehabilitation

Rehabilitation often begins in the hospital setting. The goals of rehabilitation are to help persons with acquired disabilities achieve maximum functional independence as much as possible and to attain the best possible quality of life and life satisfaction.

Vocational success has significant implications for life satisfaction after acquiring disability. Melamed et al., (1992) claimed that decreased life satisfaction has been associated with unemployment, and with passive uninvolved lifestyles following acquired brain injury. Life satisfaction following acquired brain injury seems to be directly related to employment and social integration (Corrigan et al., 2001). In that light it seems essential that vocational rehabilitation be part of early medical rehabilitation process.

As stated in Vocational Rehabilitation and Employment (Disabled Persons) Recommendation ”Vocational rehabilitation should be started as early as possible. For this purpose, health-care systems and other bodies responsible for medical and social rehabilitation should co-operate regularly with those responsible for vocational rehabilitation.”[b]

In the earlier literature Fawber and Wachter (1987) contended that vocational intervention is also appropriate in medical rehabilitation. They recommended a treatment-oriented job placement process that seeks to distribute responsibility for employment outcomes among all interdisciplinary team members throughout the entire medical-vocational rehabilitation continuum. The important benefit of aggressive vocational programming within the overall operation of any medical rehabilitation treatment program is its capacity to provide direction, focus, and meaning to other therapies or services.

Odović (2005) suggests when it is possible vocational rehabilitation process should be start during medical rehabilitation services but taking into account recommendations of *physician*. In that light it is very important ensure cooperation between institution for medical rehabilitation services and vocational rehabilitation institution. Furthermore this cooperation would enable identification of persons who need career orientation and vocational training, would enable medical counselling during vocational rehabilitation process and if it is necessary it would assure purchasing of orthotic or prosthetic device.

Evidence suggests that early vocational rehabilitation and medical rehabilitation care close to the patient’s home improve long – term recovery[c]. On other side, prolonged staying in rehabilitation services centers keep patients from returning to their home, may delay community reintegration, and social, vocational and psychological adjustment needed for optimal recovery[d].

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[b] R168 – Vocational Rehabilitation and Employment (Disabled Persons) Recommendation, 1983 (No. 168). Retrieved from http://www.ilo.org/dyn/normlex/en/f?p=1000:12100:0::NO:12100:P12100_INSTRUMENT_ID:312506

[c] United States Government Accountability Office, DOD And VA Health Care. Challenges Encountered by Injured Servicemembers during Their Recovery Process. GAO-07-589T, March, 2007. Retrieved from http://gao.justia.com/department-of-veterans-affairs/2007/3/dod-and-va-health-care-gao-07-606t/

[d] Committee on veterans’ affairs, U.S. house of representatives. *Findings of the President’s Commission on Care for America’s Returning.* Wounded Warriors. One Hundred Tenth Congress September 19, 2007. Serial No. 110–43. Retrieved from https://www.gpo.gov/fdsys/pkg/CHRG-110hhrg39452/pdf/CHRG-110hhrg39452.pdf

Power and Hershenson (1999) stated that three areas must be taken into account when person after injury is in- hospital medical treatment:

- recognition of the emotional reaction to the injury,
- short-term counselling that address emotional and related career – adjustment issues,
- vocational assessment.

3. 1. Recognition of the emotional reaction to the injury

Several factors influence the extent of impact, every chronic illness or disability requires some alteration and adjustment in daily life. Lipowski (2013) stated that the extent of impact is dependent on:

- the nature of the condition
- individual`s pre-illness/disability personality
- the meaning of the illness or disability to individuals
- individual`s current life circumstances
- the degree of family and social support emotional reactions vary, the following are common.

Many variables influence a person's reaction to physical illness or injury. Age, personality, past history, and current life situation; the nature and characteristics of the implicated disease or injury; and the quality of the patient's social and physical environment–all play a part (Lipowski, 1975). It is clearly a *multifactorial process.*

Common emotional reactions to acquired disability are:

- confusion, denial and disbelief,
- anxiety, fear of losing control,
- panic,
- inadequacy and humiliation,
- anger and frustration, resentment,
- sadness and crying,
- guilt,
- helplessness, hopelessness and despair,
- disorganisation,
- fatigue and lethargy,
- loss of interests,
- with drawal,
- loneliness, isolation and abandonment[e].

Emotional aspects associated with a new form of disability are many times a major factor in determining the person's outcome and the benefits related to rehabilitative efforts. Effective psychological intervention is beneficial where ensuring recovery from an injury that has caused a form of disability is concerned. The experience of an injury that leads to a psychological or physical disability is similar to enduring a mourning process and can involve adjustment to the disability the person experiences and may be divided into a series of four stages or tasks:

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[e] McDonald, F. & Lukins, J. Psychosocial Issues Associated with Acquired Disabilities. Retrieved from http://frankmcdonald.net/Psychosocial Issues Associated with Acquired Disabilities_Web.ppt.

- shock,
- denial,
- anger/depression, and
- adjustment/acceptance (Taormina-Weiss, 2012).

Psychological intervention such as cognitive behavioral therapy can help a person with a new form of disability to progress through the stages of disability and assist them with resolving any difficulties they may experience along the way. The result can be an increase in the person's self-esteem and confidence. Cognitive approaches through this form of therapy provide a modality for focusing on core issues in the process of adjustment, helping to reduce the person's tendency to magnify risks related to new activities, as well as helping to change any belief systems the person may have that impede adjustment. The amount of time a person with a new form of disability might spend pursuing cognitive behavioral therapy depends upon the type of disability they experience and the coping ability of the person.

3. 2. Vocational assessment

Vocational assessment is part of the *vocational rehabilitation* process. The purpose of vocational assessment is determination whether an person with acquired disability is able to return to work, and if so, to what kind of work is able to does (Odović, Rapaić, 2012).

It is a broad assessment utilizing information gathered *during* the rehabilitation process and it is dynamic in nature. The *vocational assessment answers general questions* related to plan development and the ability of persons to benefit from rehabilitation programming such as educational course work or vocational training (Whiston, 2000).

The outcome of the assessment is to explore vocational options that will be the basis for a return to work plan. A return to work is the optimal outcome. However, the outcome may indicate work may not be practical and in that case other interventions need to be considered.

Konradsdottir (2011) stated that the work ability assessment can be divided into three phases:

- basic assessment
- special assessment
- re-assessment.

The basic assessment plays a key role in the work ability assessment and is intended to be used in early intervention. Basic assessment is defined as a systematic gathering of information and advice, supervision and encouragement by the vocational rehabilitation consultant. The purpose is to promote health, improve social conditions and motivate early return to work if possible. The method is based on a process in which the vocational rehabilitation consultant, in collaboration with the individual, explores what skills the individual has or can develop and the opportunities to use them in the labor market. In the basic assessment detailed information about the overall situation of the individual is gathered and the emphasis is placed on early intervention, activation and to remove barriers to work. The conclusion of the basic assessment is based on this information. The information collected during basic assessment is necessary if further information gathering and process in the work ability assessment, such as if special assessment is needed.

Special assessment is defined as a detailed analysis and evaluation of options and possibilities of vocational rehabilitation and is done by one or more external experts (for example: doctors, physical therapists, occupational therapists, psychologists and social workers). In the special assessment the individual´s options are explored and evaluated in a more specialized manner than during the basic assessment. On the basis of the special assessment a decision is made whether and how work ability can be further promoted.

Re-assessment is defined as a re-evaluation that occurs when vocational rehabilitation plan from special assessment is completed or has not been as successful as expected. The result of the re-assessment may indicate that vocational rehabilitation should be repeated because the best possible performance has not yet been reached, or that the maximum work ability has been achieved.

3. 3. Emotional and career short-term counseling

Acquired disabilities can lead to changes that include:

- adjusting to an awareness of new limitations of body or mind,
- learning how to deal with possible modification in career plans,
- engaging in a socialization process and more definite life plans be formulated.

In – hospital rehabilitation than becomes a process of assisting the person to live with the disability in the hospital environment and helping her/him to prepare to follow career option. It means that vocational counseling is another area of intervention that can be done with the persons with acquired disability. Taking into account statement of Power and Hershenson (1999) it can be said that some of the counseling goals in this phase are:

- assisting the person to understand the emotional reaction to the disability and to learn how to deal with any negative reactions that can be developed for vocational opportunities,
- identifying personal resources such as educational background, work experience, vocational interests, etc.,
- educating the person with disability to develop effective coping mechanism and to set appropriate priorities for each (assertive responses, relaxation procedures, redefinition of personal, social, and vocational goals and possible solving techniques).

Vocational counseling can be a process that occurs during the different rehabilitation phases. For instance, in an earlier phase, information gathered from the different assessment processes (standardized and paper-pencil testing) can be used to help the individuals to understand their interests, values, needs, and direction of their vocational pursuit (Lee, 2010). In addition, vocational counseling can be used to educate the individuals in understanding the availability, specific nature, strengths and limitations of a job requirement (e.g., job analysis, labor market survey, and transferrable skills analysis).

4. Research regarding effectivity of early intervention in vocational rehabilitation

A number of recent studies indicate that the timing is important for returning to work and that early intervention is more effective than late.

Early intervention strategies in vocational rehabilitation for those with work loss of short duration lead to quicker return to work and reduced long-term disability (Haldorsen et al., 2002).

The timing of the interventions play a key role in returning to vocational activities. Buffington and Malec (1997) found patients who received vocational services within the first 12 months post injury had more opportunities and found independent job placements more quickly than those who received the same services more than 12 months post injury. This study suggests that vocational rehabilitation strategies should be implemented as early as possible to improve the likelihood of successful vocational reintegration. Main & Haig (2006) found the success in the return to employment of patients who received occupational therapy service. Authors suggest that this would support the argument for early intervention and speedy placement back into the familiar employment. Also, many of the patients had themselves prioritised return to work as a goal of their rehabilitation and the incorporation of vocational issues in their occupational therapy programme was likely to encourage active participation. Early return to work, where possible, may also avoid long periods of inactivity, with loss of confidence and self-esteem (Main & Haig, 2006).

Vocational rehabilitation interventions have been shown to be ineffective for benefit recipients who have been on benefits or out of work more than 2 years. The available evidence therefore supports the rationale of providing any vocational rehabilitation intervention before people become trapped on benefits (Thornton et al., 2003; Waddell & Aylward, 2005).

The evidence suggests that structured vocational rehabilitation interventions are most effective between about 1 and 6 months sickness absence, though the exact boundaries for the optimal opportunity are unclear. It depends on the context just when the window commences, but as time passes the worker's needs increase. The best evidence on the upper limit for effective interventions is between 3-6 months and there is progressively less evidence for effectiveness between 6-12 months, and very little for interventions after 12 months (Waddell et al., 2003).

The key element that would need to be created afresh is a single claims program that takes all those identified after about six weeks sickness absence and provides a) individual needs assessment, b) signposting to the appropriate help, and c) coordination of healthcare and workplace interventions to facilitate the return to work process (Hanson et al., 2006).

A comprehensive system for the early rehabilitation has been developed and practised within the Finnish State administration since 1989. The rehabilitation process can be initiated as soon as the working capacity of a person or work community is threatened but is not yet seriously impaired. Vaananen-Tomppo, Janatuinen and Tornqvist (2001) evaluated the outcomes and processes of early rehabilitation. The research data comprised several thousands of cases and consisted of a cross-sectional and a follow-up survey and a register-based follow-up. The surveys showed that during the rehabilitation period the average performance of the participants began to match that of the better-off non-participants, especially with respect to their general working capacity, mental well-being and occurrence of musculoskeletal problems. The sense of coherence rose in both groups, which can be partly attributed to positive changes in the workplace. In the group process, there also proved to be many factors contributing to achievement of the participant`s rehabilitation objectives. The register-based follow-up showed that rehabilitation had a positive effect on average longer-term morbidity. In the cases of early retirement, the average retirement age of early rehabilitation participants was considerably higher than the average for the State sector as a whole. A system of outpatient early rehabilitation, where the rehabilitation programme and the development of working circumstances progress side by side, proved to give encouraging results at very moderate cost.

Marnetoft and Selander (2002) investigated whether early vocational rehabilitation is more effective than rehabilitation initiated at a later stage. The study was based on a sample of 612 individuals on long-term sick leave (90 days or more) who had received vocational rehabilitation. Results have showed that early interventions are more effective than late (every 30 days of inactivity, the probability for successful rehabilitation decreased with 3.8%), and early interventions increase the probability for successful rehabilitation for women, especial for younger women. Traditionally a typical person on long term sick leave was aged 60 or more. Today illhealth is more common among younger people. The diagnoses are also changing, from traditional musculoskeletal problems to mental/psychiatric problems. Since a few years back, young people with mental problems constitute the fastest growing group among the long-term sick. No significant results were shown for men compare to women. Traditionally men have always been over-represented among those on long-term sick leave and those receiving disability pension. A few years ago, this picture changed. Today more women than men are long-term absent from work owing to illhealth.

Saltychev et al., (2011) examined factors that predict the probability of an employee being granted in-patient multidisciplinary rehabilitation to sustain worklife participation. Baseline characteristics were measured from survey responses and registers. Two types of rehabilitation were identified: ***early*** (for employees only at risk of their work capacity deteriorating in the near future) and ***later*** (for employees whose work capacity has already deteriorated substantially). Two main results can be identified in this prospective cohort study of nearly 50,000 employees in the public sector. During the mean 5.0-year follow-up, 1551 participants were granted early rehabilitation and 1293 received later rehabilitation. Firstly, employees with major risk factors for early retirement on health grounds were not more likely to be granted rehabilitation than those with no risk factors. Secondly, early rehabilitation was more likely to be associated with factors that usually predict better health and better job satisfaction, such as a permanent job, high occupational status, good job control, low job insecurity, and healthy lifestyle. Early rehabilitation was predicted by a permanent job, high occupational status, good job control and job security, non-smoking and high physical activity. Both early and later rehabilitation were predicted by the use of painkillers, anxiety, and sickness absence. Later rehabilitation was also predicted by older age, poor self-rated health, and low educational level. In conclusion authors stated that early rehabilitation and, to a lesser extent, later rehabilitation were more often granted to employees with few known risk factors. This finding suggests that preventive measures to reduce the risk of disability pension amongst high-risk employees through rehabilitation are not targeted as intended.

CONCLUSION

Acquisition of disability is a traumatic experience for the person and often drastically changed her life. Depending on the severity of acquired disability a person's ability to perform vocational duties can be significantly reduced. There are evidence that work is generally good for physical and mental health and well-being. Returning to some form of productive work improves clinical outcomes as compared to passive medical rehabilitation programs.

The nature of the recovery process is highly individualized and requires professional judgment to determine the appropriate time to begin vocational rehabilitation. Vocational rehabilitation should be started as early as possible when person is medically stable. Implementing an early vocational rehabilitation interventions in the hospital setting has good potential for enhancing possibilities for return to work after acquiring disabilities.

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Theme 2

Functional Abilities of Children with Developmental Disabilities

GLUTAMATE EXCITOTOXICITY AND NEONATAL HYPOXIC-ISCHEMIC ENCHEPALOPATY

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SUMMARY

Neonatal hypoxic-ischemic encephalopathy is a significant cause of infant mortality and long-term morbidity. Cellular and molecular mechanisms of such brain injury could be partly explained by glutamate excototoxicity. The basic mechanisms of neurodegeneration is particularly important for understanding neonatal hypoxic-ischemic brain injury. It seems that hypoxic-ischemic brain injury disrupts brain glutamate metabolism. Multiple pathways link excitotoxicity, oxidative stress, and inflammation in the acutely injured brain. The apoptosis contributes significantly to cerebral damage in the perinatal period.

Key words: hypoxic-ischemic encephalopathy, excitotoxicity, glutamate metabolism

INTRODUCTION

Hypoxic-ischemic cerebral injury injury in the newborn is a significant cause of infant mortality and long-term morbidity, such as cerebral palsy, mental retardation, visual impairment and epilepsy (1). Cellular and molecular mechanisms of such brain injury could be partly explained by glutamate excitotoxicity. Glutamate is the major excitatory neurotransmitter in mammalian brain. It can activate three main amino acid receptors that are broadly classified based on their selective responses to specific agonists (e.g. N-methyl-D-aspartate (NMDA), alfa-amino-3-hydroxy-5-methyl-4-isoxazole propionic acid (AMPA), kainite). Overactivation of excitatory amino acid receptors (i.e. excitotoxicity) contributes to neurodegeneration in a broad range of acute and chronic neurologic disorders (2).

The basic mechanisms of neurodegeneration is particulary important for understanding neonatal hypoxic-ischemic brain injury. It seems that hypoxic-ischemic brain injury disrupts brain glutamate metabolism. Analysis using magnetic resonance spectroscopy has revealed that neuronal glutamate metabolism is coupled to cerebral glucose oxidation, showing that the cycle of glutamate release, re-uptake, and resynthesis is a major metabolic pathway in the brain (3). Elevated levels of cerebrospinal fluid glutamate have been documented in infants with severe hypoxic-ischemic injury by direct cerebrospinal fluid measurements and by proton magnetic resonance spectroscopy. It was confirmed that cerebrospinal fluid levels of excitatory amino acids are directly proportional to the severity of clinical encephalopathy (4, 5, 6).

Two mechanisms contribute to ischemia-induced increases in synaptic glutamate: increased efflux from presinaptic nerve terminals and impaired re-uptake by glia and neurons. The initial increase in efflux is mediated by a calcium-dependent process through activation of voltage-dependent calcium channels (7). Removal of glutamate from the synaptic cleft depends primarily on energy-dependent glutamate transporters, which are predominantly glial. Any pathophysiologic process that deplets energy supply (e.g. hypoxia-ischemia, hypoglycemia, prolonged seizures) will disrupt these mechanisms and result in increased synaptic glutamate accumulation.

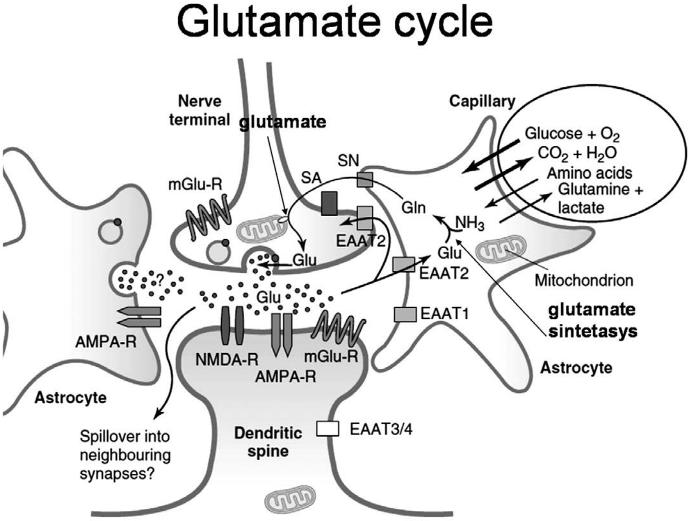

Figure 1 Glutamate metabolism

In neonatal and adult animal models, overactivation of NMDA- and AMPA-type excitatory amino acid receptors contributes to ischemic neuronal injury (8). When the neurotransmitter recognition site is activated by glutamate, the join channel allows influx of calcium and sodium. The resulting increase in intracellular calcium is the stimulus for a multitude of downstream events. The NMDA receptor is relatively overexpressed in the developing brain compared with the adult brain: in postnatal day 6 to 14 rats, the NMDA receptor is expressed at 150% to 200% of adult levels. In the setting of hypoxia-ischemia, NMDA receptor overactivation leads to massive Na+ and water influx, cell swelling, elevated intracellular calcium and its associated mitochondrial dysfunction, increased nitric oxide production and accumulation of potentially toxic free fatty acids, and cell death by apoptotic or necrotic mechanisms.

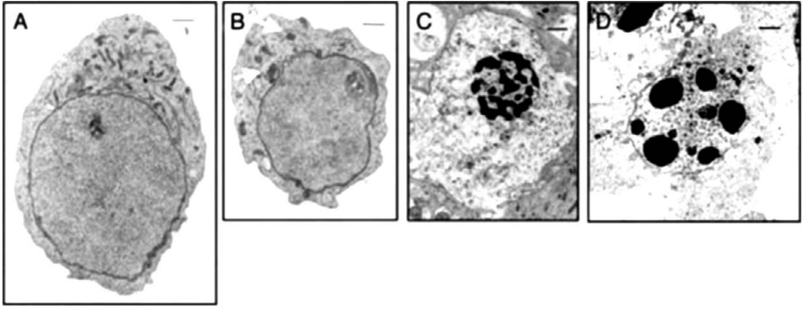

Figure 2 Two modes of cell death – apoptosis and necrosis

There is evidence that susceptibility to NMDA and AMPA-mediated excitotoxicity peaks in the immature brain and that treatment with NMDA and AMPA receptor antagonists confers robust protection against neonatal hypoxic-ischemic brain injury. However, concerns have been raised that NMDA receptor antagonists might have specific risks in the immature brain; blockade of NMDA synaptic activity could disrupt critical neurodevelopmental processes. Whether AMPA antagonist, which can block neuronal and white matter hypoxic-ischemic damage in neonatal rodent models, have less potential risks in the immature brain than do NMDA antagonists is an important question to study.

Oxidative stress

Oxidative stress describes the alterations in cellular milieu that result from an increase in free radical production as a result of oxidative metabolism under pathological conditions. In the brain injured by hypoxia-ischemia, excitototoxicity and oxidative stress are strongly linked. In cells with normally functioning mitochondria, more than 80% of available oxygen is reduced to energy equivalents (ATP) by cytochrome oxidase. The rest is converted to superoxide anions that under physiologic conditions are reduced to water by antioxidant mechanisms. A consequence of mitochondrial dysfunction is an accumulation of superoxide, and any process that depletes antioxidant defences will result in the default conversion of superoxide to even more eractive species such as hydroxyl radical. Excitotoxicity causes energy depletion, mitochondrial dysfunction, and cytosolic calcium accumulation, leading to the generation of free radicals such as superoxide, nitric oxide derivates, and the highly reactive hydroxyl radical.

Nitric oxide metabolism provides another critical link between excitotoxicity and oxidative injury in the hypoxia-ischemia-injured brain. Nitric oxide is produced constitutively in endothelium, astrocytes, and neurons in response to an increase in intracellular calcium. Hypoxic-ischemic increase in nitric oxide production has multiple potential beneficial and detrimental effects.

Inflammation

Cytokines that have been strongly implicated as mediators of brain inflammation in neonates include interleukin-1 beta, tumor necrosis factor-alfa, interleukin-6 and membrane cofactor protein-1 (9). Measurements of cerebrospinal fluid and plasma levels of several cytokines in asphyxiated term infants suggest that the injured brain can be the source of acutely elevated cytokine levels. Evidence that cytokines can amplify hypoxic-ischemic brain damage in this setting includes the finding that treatment with a specific antagonist of interleukin-1 beta is protective.

Several anti-inflammatory drugs, including specific cytokine antagonists that are clinically available, attenuate hypoxic-ischemic brain injury experimentally, but only if these agents are administered before or very soon after the initiating insult.

Multiple pathways link excitotoxicity, oxidative stress, and inflammation in the acutely injured brain. NMDA receptor activation is a potent stimulus for cytokine and chemokine signaling. Microglia, the resident brain macrophages, play a central role as effectors of local brain inflammation; activated microglia produce a broad range of factors that can contribute to tissue injury (e.g., free radicals), but paradoxically, these cells also produce neurotrophic factors that can enhance repair after brain injury.

Inflammation may have beneficial effects and contribute to recovery after acute brain injury and anti-inflammatory agents can disrupt specific endogenous repair mechanisms.

Apoptosis

Acute hypoxic-ischemic injury can elicit neuronal and oligodendriglial apoptosis and necrosis. These modes of cell death are classically distinguished based on electron microscopic evaluation of nuclear morphology (particularly the distinctive condensation pattern of nuclear hromatin). The apoptosis contributes significantly to cerebral damage in the perinatal period.

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IDENTIFICATION OF CHILDREN WITH DEVELOPMENTAL DELAYS / DISABILITIES IN PRESCHOOLS

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SUMMARY

Research shows that developmental disabilities and specific developmental problems in children remain undetected by parents, teachers and professional associates. Our goal was to establish the method of identification of children with developmental delays/ disabilities in the existing procedure of a preschool and the system / procedure of ongoing support. In the existing procedure of preschool institutions there is no procedure for dealing with parents' concerns; 77.4 % of the teachers claim that they notice children who are in some way different from typical children. There are significant differences in the responses of the teachers and the expert service as to the beginning of child observation, giving of instructions to a teacher after the child is observed and the approach to the child is adjusted after observation and adjustment of access to the child. Teachers and members of the expert service show a high degree of agreement, statistically significant, about the statements regarding the need for a special educator as a professional associates in the preschools.

Key words: children with developmental delays / disabilities, preschool, identification, support, teachers, expert service

INTRODUCTION

Identification of children with developmental delays / disabilities in preschools as a form of early detection and intervention is threatened by the lack of validated procedures, protocols and adequate instruments. Research shows that developmental disabilities and specific developmental problems in children remain undetected by parents, teachers, professional associates. Children with developmental delays / disabilities are identified only when they join the school system, as a result of significant development of complications that are not recognized on time. It is a nursery, i. e. preschool period that offers an opportunity to recognize such children by means of reliable instruments and techniques, and to provide them with adequate support. Adequate support includes adjustments in the environment of the child, in all developmental domains, according to the current level and the development abilities of the child, where through quality interaction in an educational group such a child has the possibility to develop all their abilities (Ilić, 2015).

In recent years in our country, as in most other countries, the inclusion of children with disabilities is required by law. The existence of a large number of children with disabilities and specific developmental problems in preschools, with a tendency to increase, without adequate process of problem identification, and consequently without adequate support in the preschool age, justifies the need for research in this field. In the process of detection / identification and support to children in preschools we anticipate active participation of teachers, parents and special educators.

Disability and specific development problems require parallel intervention in at least two different areas. The first area includes all forms of treatment which aims to improve the effectiveness of the child's behavior in those domains in which weaknesses are manifested. The second area, equally important as the first one, includes intervention within the environment of the child. Parents and preschool staff must be aware of the nature of certain problems, real restrictions imposed by them, and a number of external influences, which can reduce its consequences in everyday behavior and communication.

In this way, through such intervention settings, the environment is in a position to offer better support to the development of the child, taking over part of the corrective influence and form a positive atmosphere, in which the interaction between the child and significant persons in their world is relieved of further misunderstanding. This emphasizes that the holders of support for the child should be the ones who surround the child directly: parents and professionals working in a preschool (it is necessary that the different profiles of experts work closely together, preschool and health care team, diagnostician and therapist). A good example of this approach is a paradigm offered by Teeter and Semrud-Klikeman (1997), which requires four specific levels at which, ideally, the identification and intervention for children with specific developmental disorders would be performed:

- problem identification (based on a child's achievements or from an interview with parents);
- formulation of special strategies related to learning, outside behavior control (including parent counseling);
- part of specific treatment that can be provided by the institution;
- regular monitoring of realization and effects of these interventions, which enables the modification and amendment of planned strategies.

The basic principle of intervention as regards developmental disabilities and specific development problems is timeliness: the earlier a problem is detected and treatment is is initiated, the greater are the chances of achieving the desired effects (Webb et al., 2001). It is particularly important that the treatment is time- aligned, that it even precedes a critical period of maturation, which, depending on which skills are concerned, may involve initiating of treatment procedures ideally in the first years of life.

New perspectives of support, with the historical foundation in the already mentioned theories, are based on the system-ecological approach, i. e. the holistic view of the child's development (all domains of development: cognitive, linguistic, physical, social and emotional, interconnected), dynamic (environment should change to remain supportive and responsive to changing individual needs of the child), transactional (development is encouraged by two-way, reciprocal interactions between the child and their environment, and the outcomes are seen as a result of constant, dynamic interplay of behavior of the child, the parents' response to the child's behavior, and environment –related variables that may affect the child and the parents), knowledge or the development is unique, which means that an individual builds their own, unique perspective (Lewis & Porter, 2004).

METHODOLOGY AND IMPLEMENTATION OF RESEARCH

On the basis of the difficulty in identifying children with developmental disabilities / delays set out in the introduction, and the current system of support, we started from the assumption that the existing system of identification and support to children with disabilities in preschools is not comprehensive and complete.

According to this hypothesis, we have set the following goal: to establish the method of identification of children with developmental delays/ disabilities in the existing procedure of a preschool and the system / procedure of ongoing support.

Place of research: Preschool Rakovica, kindergartens Dusko Radovic, Orascic and Izvorcic; Preschool Palilula, kindergartens: Poletarac, Mali princ; during the years of 2011/2012.

The research was conducted in several stages. The preparatory phase included the selection of two preschools at the level of the City of Belgrade, obtaining approval and analysis of existing procedures for early detection of children, instruments used, types of monitoring and support to children with disabilities and disorders. At this stage, a dedicated instrument was designed for teachers and expert service that measures the degree of agreement of respondents (teachers, staff, and expert services) with certain statements related to the process of detecting the children, the cooperation of teachers and expert services on the same issue, as well as the cooperation of teachers and expert services with parents.

Description of the sample of teachers

Table 1 *Distribution of teachers by preschool*

Preschool	number	percentage
Pallilula	24	38.1
Rakovica	39	61.9
In total	63	100

61.9% of the teachers is from Preschool Rakovica, while 38.1% is from Preschool Paliliula.

Table 2 *Distribution of teachers by years of working experience*

number	minimum	maximum	mean	standard deviation
63	1,00	33	14.61	10.905

On average, teachers have fourteen years of working experience, the minimum working experience being one year and the maximum working experience being thirty three years.

Description of the sample of expert service

Table 3 *Distribution of expert service staff by expert profile*

	number	percentage
pedagogue	6	50.0
psychologist	4	33.3
speech therapist	2	16.7
In total	12	100.0

50% of the examined expert services include pedagogues, 33.3% psychologists, 16.7% speech therapists.

Table 4 *Distribution of expert service staff by years of working experience*

	minimum	maximum	mean	standard deviation
12	1	32	8.83	9.944

On average, professional associates have nine years of working experience, the minimum working experience being one year, and the maximum working experience being thirty two years.

Description of instruments

The QUESTIONNAIRE designed for teachers was formed on the principle of Likert scale, according to which the respondent has the task to express their level of agreement or disagreement with each and every statement on a five-point scale: “I strongly disagree”, “I disagree”, “I agree and I disagree”, “I agree”, “I strongly agree”. The statements with which teachers indicate their level of agreement/ disagreement are related to the procedure of identification of a child who is not coping with a group of children, communication with the expert service on this and related issues, its inclusion in the process of assessment and support for the child. In the second part we examined the level of agreement with statements of teachers with regard to cooperation with parents as well as the need to involve special education experts in a preschool expert service.

The QUESTIONNAIRE designed for members of the expert service is made on the same principle, and is intended to describe existing procedures for the detection of children, assessment and support in preschools. The statements with which professional associates indicate their level of agreement / disagreement are related to communication with teachers, giving instructions and information related to a specific problem, the inclusion in the process of assessment and support for the child. In the second part we examined the level of agreement of the expert service with regard to cooperation with parents, the burden carried by experts in the expert service, as well as the need to involve special education experts in a preschool expert service.

PRESENTATION OF RESULTS AND DISCUSSION

Current support to children with developmental problems in preschools

Teachers' statements

Table 5. *Distribution of teachers' answers to the statements regarding the question: After I forward information to the expert service that I have a problem with a child in the group, the expert service initiates the process of observing the child in a short period of time (3 days).*

	number	percentage
I strongly disagree.	5	8.8
I disagree.	16	28.1
I agree and I disagree.	21	36.8
I agree.	8	14.0
I strongly agree.	7	12.3
In total	57	100.0

There has been a very high percentage of indecision regarding these statements, even 36.8 % of teachers both agrees and disagrees (we should seek clarification of this phenomenon in order to set a clearer structure of the duties and responsibilities of all participants in the educational process). 36.9 % of teachers disagrees with this statement in varying degrees, which can indicate the teachers' frustration and the cause of the lack of interest to send the child to the expert service.

Table 6 *Distribution of teachers' answers to the statements regarding the question: After observing the child, the expert service gives me instructions for work with the child.*

	number	percentage
I disagree.	1	1.8
I disagree.	11	19.3
I agree and I disagree.	21	36.8
I agree.	20	35.1
I strongly agree.	4	7.0
In total	57	100.0

Indecision was recorded in 44.3 % of teachers, which leads us to question the cause of it. Do teachers receive feedback, or are not satisfied with it, or with the help of these instructions do not solve the problem that remains in further implementation of activities with this child or do not receive adequate support, or the support is completely absent (13.1 % of teachers claimed that they do not receive instructions)? Setting clear procedures, guidelines, responsibilities and rights of each team member with appropriate instruments would lead to a solution that would bring satisfaction to everyone in their role and competence, and the child would be in the center of adequate support.

32.8% of teachers fully agrees with the statement "Every child for whom I notice any deviation, standing out, different behavior in a group of children, I inform the expert service", 44.8% agrees, 15.5% agrees and disagrees, while 6.9% does not agree. In answers to this statement it is noticed that teachers do not send all the children for whom they notice any deviation, namely 22.4% of them does not agree with this statement in varying degrees. In the process of early identification and support of children in the preschools there are no clear procedures, division of responsibilities, a description of the scope of work of those involved in the educational process. Following the current results, based on the teachers' statements, we can conclude that 36.8% of teachers does not receive clear instructions, plan and adjustments for working with a particular child. 42.6% of teachers manage on their own according to their knowledge and experience, 75.5% of teachers asks colleagues for advice when there is a problem with a child, while 36% of teachers gave up notifying the expert service about every problem that occurs in the process of working with children. 82.3% of teachers agrees with the statement "It would be of great benefit to get clear instructions on how and what to do with the child", only 17.7% of teachers is undecided, and there are no teachers that oppose this statement.

How teachers see the presence of a special educator as an associate and what their expectations are can be seen through the answers to the following statements "From a special educator I could get clear instructions how to act, how to adapt activities for a child who behaves differently." 77.5 % of teachers agrees and 21 % of teachers agrees and disagrees. None of the teachers expressed disagreement. We conclude that a high percentage of them indicate trust and a positive attitude towards the special educator as a professional associate. 93.5 % of teachers agrees with the statement "The presence of a special educator in the kindergarten would allow me higher quality work and relief in working with children who behave differently and have some difficulties", 4.8 % of them both agrees and disagrees, while only 1.6 % of them expresses disagreement. The statement "Only a pedagogue and a psychologist, as expert service associates, can provide useful information about the child" is confirmed by 32.3 % of teachers, the same percentage of them agrees and disagrees, while most of them, 35.5 % expresses disagreement in this rather balanced distribution.

The teachers' statements as regards relationship with parents. According to the teachers, parents are mostly interested in child activities in the kindergarten (54.3 %), 11.9 % is not interested, while 33.9 % of teachers is undecided regarding this statement. Parents are asking for the child's behavior in the group, according to 71.6 % of the teachers, 25 % of the teachers is undecided, while only 3.3 % of them disagrees. 60 % of teachers agrees with the statement that that they are limited as to what they can say to parents about the child's behavior, 23.3 % agrees and disagrees, while16.7 % disagrees. Teachers show a high degree of agreement with the statement "When I have a problem with a child I feel free to be able to share it with their parents." 78.4% of teachers agrees with the statement, 18.3% agrees and disagrees, 3.3% disagrees. We see a possibility for a high degree of cooperativeness and moderate openness of teachers to introduce parents to events and possible difficulties of their children in the educational process. However, only 33.4% of the teachers agrees with the statement "I can openly talk to parents about the child, the child's behavior, and my observations,", while the greatest percentage indicates indecision (60% agrees and disagrees). From the initial openness shown by the teachers in the first statement regarding cooperation with parents, the detailed analysis shows that they reflect, however, according to further statements, to whom, how and how much they will say. Specifically, 80.3% of the teachers are ready for limited cooperation, which is graded and cautious in terms of the method and quality of addressing a parent. 11.7 % of teachers have superficial communication with parents in terms that they provide information only when the parents ask for it. According to the teachers' statements, the interest of parents for activities of the child in the kindergarten is present in 44.1 %, 49.2 % of the teachers is undecided as regards this statement, while 6.8 % of them claims that parents are not interested. This distribution of results is the same for the teachers' statements regarding the interest of parents for the child's behavior in the kindergarten.

The reason for the lack of interest of parents due to their work overload and lack of parental time for children is supported by 26.6 % of the teachers, 41.7 % agrees and disagrees, while 31.7 % of the teachers disagrees with that.

Statements of preschool expert service associates

91.6% of expert service associates agrees with the statement that after observing a child they give instructions to teachers on how to treat the child and which adjustments to make, while 8.3% agrees and disagrees. The statements that they give instructions to teachers on adapting of activities in the educational process for children with disabilities is also confirmed by 91.6% in varying degrees of agreement. On the basis of these statements we come to the conclusion that after observation of the child, the members of the expert service give instructions to the teachers as well as some adjustments for the child.

Based on the conflicting claims of the teachers and members of the expert service we realize that there are different perspectives and expectations. One hypothesis might be that teachers do not deny the presence of the expert service but the way in which the experts provide support, instructions and guidelines are not operational in the work process of the teachers.

50% of the members of the expert service agrees with the statement "After we observe the child we have an interview with their parents", while 50% agrees and disagrees with it. A high percentage of members of the expert service shows indecision about the willingness of parents to accept their instruction (66.7%). According to the experts, 58.3% of parents seek help from the expert service when they are anxious for some reason. Experts agree with the statement that they monitor children with disabilities and their achievements on a monthly, quarterly, semi-annually in 75%, while 25% of the associates shows indecision (agrees and disagrees). With the statement "After I get information from teachers that they have a problem in a group with a certain child, in a short term (3 days) I begin a process of observing the child" 25 % of the members of the expert service fully agrees, 58.3 % agrees, and 16.7 % agrees and disagrees.

We find the that the experts are divided as regards their agreement with the following statement: "After observation and interviews with parents, we give teachers a plan they should follow in their work with the child, adjustments regarding inclusion.": 25% of the members of the expert service fully agrees, 33.3% agrees, 33.3% both agrees and disagrees, while 8.3% disagrees. Regarding the statement, "The presence of a special educator, as an associate in teams in the preschools, would facilitate the work with children who exhibit disabilities or problems i their development or behavior", there is a high degree of agreement with 27.3% of the members of the expert service fully agreeing, 45.5% of them agreeing, and 27.3% both agreeing and disagreeing. There is no disagreement about this statement. In line with this is the degree of agreement with the statement "It is enough that there is a special educator and a psychologist in the expert service as support for children with disabilities and disorders in development and behavior.", with which 8.3 % of the members of the expert service strongly disagrees, 75 % disagrees, and 16.7 % both agrees and disagrees. There is no agreement about this statement.

Current support through the analysis of plans and reports of work in preschools Palilula and Rakovica

In the analyzed reports / plans of the preschools there is no information either about the procedure of identification of children with delays / disabilities, their monitoring or about support systems for them. We noticed only the aspects of support for children with visible disabilities and difficulties.

According to the data on the number of children and the organization of educational personnel, an expert from the expert service Palilula covers five hundred and six children (1:506) and forty-seven teachers (1:47) in their field of work. A speech therapist in their field of work is responsible for one thousand six hundred and eighty-seven children (1:1687). The number of children in the preschool Palilula is 5063, distributed in 242 groups, while the preschool Rakovica is noticed to have one third less, 3660 children distributed in 149 groups. The data provides insight into the degree of workload of members of the educational staff.

Programs of the preschool Palilula that are important for our analysis:

Program for work with children with developmental disabilities. In the municipality of Palilula the inclusion of children with disabilities is done at three levels: *in a regular educational group* (individualized mode – removing physical and communication barriers in the institution with respect to certain principles set out in detail in the presented report); *in a regular educational group with additional support and IEP* (additional levels of support in the form of creating individual education plan and provision of support to the teacher in the implementation thereof, as well as the adjustment of the environment); *in a development group based on the IEP.* (It includes children with severe disabilities). The IEP may be made according to an adjusted program (IEP – AP) and a modified program (IEP – MP). To create the IEP according to the modified program, the expert team for inclusive education obtains the opinion of an interdepartmental committee that assesses the need for additional education, health and social support to the child.

Professional family support programs: *information* (general parent-teacher meetings and meetings in groups, individual interviews with parents, parents boards, "open door day"); *education* (thematic parents meetings during the year, events, celebrations, exhibitions, a parents corner...); *direct participation* (participation of parents in adaptation, planning and implementation of topics, workshops, playrooms for children and with children, decorating rooms for parents, breeding area, purchasing and making resources, toys, costumes for theater productions, decorating and equipping of the yard with a variety of props and machines, preparation and realization of celebrations in the kindergarten, visits to workplaces of parents of specific professions, excursions and activities in nature, celebrating Childcare's Week, Christmas and New Year holidays, Easter, sales exhibition for the purchase of certain materials (didactic, audio visual aids, toys), participation in charity events...).

In the preschool Palilula there is the "Team for inclusive education" that appoints the "Team for providing additional support for the child." This team consists of: a teacher, a nurse-teacher, professional associates, associates, parent or guardian, and if necessary, pedagogical assistant and an expert outside the institution. This team makes a pedagogical profile of the child. We have found that the team does not have experts in the field of special education and rehabilitation that has competence (based on theoretical and practical content acquired during their studies) to create the IEP and the adjustments that need to be made for the child. Experts of this profile are able to make a good assessment of the child's abilities and help teachers, pedagogues, and parents in adapting the content, activities for each particular child.

As part of the program presented in the plan / report, there are no exposed indicators, the indicators that would evaluate the implementation of the program, its achievements, progress or possible difficulties encountered in the work.

Preschool institution Rakovica: There are no specific programs, except for children with disabilities in a development group in a kindergarten "Dusko Radovic". The report describes the cooperation of the preschool with the Health Care Center Rakovica (to carry out systematic check ups: dentist, pediatrician, ophthalmologist, etc.), in which there is no description of cooperation to support children with disabilities and cooperation at the level of the educational process. A speech therapist and a psychologist work in the main building of the Health Care Center while one pediatrician from the medical center is involved in the interdepartmental committee on the municipal level. All the areas of the report that talk about connecting with the local community, and with the scope of work of associates, indicate the possibility of developing a network of support for the child with disabilities to be enrolled in this institution.

Through the very analysis of annual reports of the preschools we looked at a large number of children against a small number of members of the expert service and undeniable and evident burden on members of the expert service. There are no detection instruments, and established procedures to support children. Speech therapy work essentially consists of working with teachers, giving advice and possibly of designing education in the form of workshops for the development of speech and language. The burden on members of the expert service is also considered through their level of agreement with the statement "Too many children are covered by one associate on the field within a preschool." With the above statement 16.7% of the members of the expert service strongly disagrees, 41.7% does not agree, and 41.7% both agrees and disagrees. There is no agreement about this statement although we expected it due to the already presented the factor of the burden in the numbers of annual reports. It is obvious that the members of the expert service on a subjective level do not feel this kind of burden, and show a high degree of indecision regarding thereof. It would be interesting to examine in detail this hypothesis through a detailed analysis of the tasks and responsibilities within their scope of work in the preschool institution. According to a further analysis of the statements of the members of the expert service we can see that on average, on a monthly basis, teachers seek help in the field about 6 times (minimum two, maximum twenty times). One professional associate conducted the observation of children per call 89 times on average during the research year (minimum twenty, maximum 304 observations). One professional associate in the field observes an average of 12 kindergartens (minimum five, maximum of thirty-three). One associate at a corresponding site visits on average one hundred and fifty groups of children (minimum fourteen, maximum of 712). One professional associate in the field covers an average of 3250 children (minimum 1100, maximum 3800).

Analysis of the relationship between the answers of the teachers and the members of the expert service to the statements with the same content

When analyzing the relationship between the answers of the teachers (57 teachers) and the members of the expert service (12 members of the expert service) to the statements of the same content, only on the basis of the frequency of the answers with a different level of agreement / disagreement, we noticed that there are differences.

Table 7. *Distribution of the results of the relationship between the statements of the teachers and the statements of the members of the expert service "After informing the expert service that I have a problem with a child in a group, the expert service starts the process of observing the child a short term (3 days)" / "Once we get information from teachers that they have a problem with a certain child in a group, we start the process of observing the child in a short term (3 days)"*

	number of respondents	average	standard deviation	standard average error
teachers	57	1.93	1.132	.150
expert service	11	3.18	.603	.182

The results of the t–test showed that there is a statistically significant difference in the answers of the teachers and the expert service (t=3.558, df=66, p=.001).

In the statement "After observing the child, the expert service gives me instructions for working with the child" / "After observing the child, we give instructions to the teachers on how to deal with the child and what adjustments to make" there is a statistically significant difference in the answers of the teachers and the expert service (t=-4418, df=67, p=.000). The results of the relationship of the statements of the teachers and the members of the expert service: "The expert service gives me a plan on what I should do with the child, and some adjustments that need to be made so that the child can be completely included /After the observation and interviews with parents, we give the teachers a plan that they should follow in their work with the child, and adjustments for the inclusion" also show that there is a statistically significant difference in the responses of the teachers and the expert service (t=-2,503, df=67, p=.000).

Statistical significance within the relationship of the statements about the presence of a special educator as an associate in the preschool, who would facilitate the work with children who exhibit developmental delays, developmental disorders, does not exist. Namely, as to this statement, agreement is achieved between the teachers and the professional associates in a positive direction (t=1.173, df=72, p=.244), as well as on a similar basis regarding the quality of work and relief in working with children who behave differently (T=1.414, df=71, p=.162). We conclude that both sides, the teachers and the expert service recorded the need to include a special educator in the process of the identification and support of children with disabilities / delays in development, and see their presence as a key to improve work with these children. A special educator as an expert is not present and is not legally prescribed to have their place in the team, except in development groups, where they do their job in the form of implementing individual education plans.

CONCLUSIONS

- In the existing procedure of preschool institutions there is no procedure for dealing with parents' concerns.
- 77.4 % of the teachers claim that they notice children who are in some way different from average children. Of the total of the observed children, according to the same claims, 77.6 % are sent to the expert service, while 22.4 % of the are not. We conclude that there is a high percentage of children who remain noticed, but not addressed in the further procedure.
- 36.8 % of the teachers does not receive clear instructions, plan and adjustments for working with a particular child, 42.6 % manages on their own according to their knowledge and experience, 75.5 % of the teachers asks their colleagues for advice when there is a problem with a child, 36 % gives up informing the expert service of any problem that they have with children in a group.
- There are significant differences in the responses of the teachers and the expert service as to the beginning of child observation, giving of instructions to a teacher after the child is observed and the approach to the child is adjusted after observation and adjustment of access to the child.
- Teachers and members of the expert service show a high degree of agreement, statistically significant, about the statements regarding the need for a special educator as a professional associates in the preschools. In the process of the identification and support of children with disabilities / delays, they regard the presence of a special educator the key to better work with these children.

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LIP-READING WITH DEAF AND HARD OF HEARING PRESCHOOL CHILDREN[a]

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SUMMARY

Pedagogical and educational work with deaf and hard of hearing children is characterized by the application and teaching of lip-reading. Speech is acquired spontaneously by listening. In the absence of auditory stimuli, deaf and hard of hearing children follow carefully the movements of the lips of a person who speaks. Thus, visible images of the movements of speech organs which take part in the articulation are created. Visual perception of speech does not only involve recognition of each individual sound, but it is also important that a child should perceive the information as a whole and understand its meaning.

The aim of our research was to establish the level of success in lip-reading separate terms and sentences with deaf and hard of hearing preschool children.

We examined the success in lip-reading within the following areas: body parts, domestic and wild animals and clothes and shoes. Moreover, we examined the acquisition of first adjectives, verbs and pronouns which children at this age should have learnt as well as the success in lip-reading sentences (which related to the story "the Gigantic Turnip"), which we checked though pictures.

The sample comprised 15 preschool children who attend preschool groups at schools in Belgrade.

The results obtained show that the terms within the area of body parts are best lip-read, while the poorest results were achieved in lip-reading terms relating to clothes and shoes. The terms which are more frequent, which are used more and which the children have had some experience with are better lip-read although they are less legible by the structure of sounds. The significance of early knowledge of signs facilitates the acquisition of terms as well as lip-reading. A lot of children responded to the spoken term with an adequate sign and showed a higher level of understanding of what was spoken than the children who did not use a sign (a gesture). In lip-reading sentences, the children perceived the length of sentences and recognized individual terms, while they gave adequate responses from the context of pictures.

Key words: lip-reading, visibility (legibility) of sounds, deaf and hard of hearing children, preschool age

INTRODUCTION

The first symbols of oral – vocal speech pointed the audience to the mouth and face of their interlocutors. Today, as well, when speech reaches a high level of development,

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one often seeks, by watching the interlocutor's face and mouth, to get more information about the subject of conversation. This is particularly noticeable under the conditions of somewhat difficult communication (i.e. high environmental noise or when speech is faintly heard). We can say that speech reading is not unique to deaf people, but also to people who don't have a hearing problem, except that their percentage of participation of vision is considerably lower.

There are still different opinions on whether the child, in developing speech, relies more on optical images of a word, or just the acoustic symbols, and whether it's exactly these images that make it possible for the child to develop speech. What is mutual is agreeing about the fact that the child is carefully monitoring the movements of the lips of the person who speaks, and in that way it creates visible images in its mind.

A child who can hear, perceives speech and controls it through hearing, which is above the stimulus' speech threshold. Auditory control of speech does not stop in the chain of communication, not even when speech is adopted and automated. A child with a hearing impairment does not develop speech, and in an adult who has a hearing impairment, an impairment of speech ensues.

For children with impaired hearing, visual perception is crucial in formation of speech.

The bigger the hearing loss is, the more the person depends on good quality visual information in order to understand speech. We can say that everyone has, in part, the need to lip-read. Dimić (2002) states that understanding speech is improved when speech reading is combined with hearing. In working with older children and adults it is pointed to a strong link in using the remains of hearing together with lip-reading and / or sign language.

Lip-reading (Speech reading)

Deaf and hard of hearing children are instructed to use alternative forms of communication which require information to be processed in a different, and cognitively more demanding, way. Visual perception of speech does not only imply recognizing each individual voice, but it is important that the child perceives the information and understands its message. Because of their inability to learn by listening, they are directed to speech reading from the mouth and the face of the interlocutor. However, lip-reading is not the same as listening. Deaf and hard of hearing children can not control their pronunciation by watching, like normal hearing children do by listening. For this reason, hearing impaired children, in addition to the visual perception of movements of speech organs, have to use the help of the remained hearing, kinetic and tactile stimuli and, with their help, reorganize phonemic coupling.

We can say that lip-reading is a complex activity and it is a result of harmonious operation of various cortical structures and connections and not only connecting verbal symbols and adding up phonemes into words and sentences, but also understanding the thoughts and ideas. The nature of lip-reading, its quality, is determined by cognitive development as well as neurological conditionality.

The first definition of speech reading from the face and mouth was given by John Bulwer in the seventeenth century. It reads: Listening with the eyes is a very delicate skill through which a keen and attentive eye can, depending on lip movements, "hear" what any person is saying (Dimić, 2002).

Speech reading from the mouth and face of the interlocutor is the ability to receive optical images of words, process them, understand them and confirm them in speech behavior and activity (Dimić, 2003).

Reading oral-vocal speech from the mouth and face of the interlocutor is part of a chain of speech communication that includes the speaker and the one who speech reads. However, speech reading can not be reduced just to visual perception of movements of speech organs, it includes the remaining auditory capabilities, as well as thought processing of the received data (Dimić, 2002).

Research on visual perception of speech without its accompanying auditory stimulus was carried out on a sample of two groups of patients. The first one consisted of the University of Maryland students (N=96), and the second one consisted of deaf adult subjects with severe and very severe hearing impairments who were students of Gallaudet University (N=72). Participants were aged 18 to 45. Video recordings of a male and a female speaker, recorded in such a way that their faces filled the screen, were used, the monitor was a color monitor, at a distance of two meters away from the respondents. Meaningless syllables and monosyllabic words and sentences were presented. Deaf examinees achieved statistically significantly higher mean values than the hearing examinees. The authors have concluded that most patients with early hearing loss, especially with congenital profound impairments, speechread from the lips more precisely due to the need to further understand speech through visual perception (Bernstein, Demorest & Tucker, 2000).

Visual perception of speech was tested in people with impaired hearing which occurred at an early age (N=112), and it was compared with that of 220 hearing examinees. The average age of examinees was 23. The instrument that was used is a speech reading test that includes 30 sentences, on video recordings (Bernstein & Eberhardt, 1986). The sentences were presented with the help of a computer that was located 0.5 m away. After they had read a sentence, the examinees typed what they thought the speaker had said. The achievements of examinees who lost their hearing early significantly exceed the achievements of hearing examinees. Deaf respondents are better at reproducing words in sentences. The ability to speech read is positively correlated with self-assessment of the skills of communication through spoken language. The conclusion is that experience has an important part in communication through speech (Auer & Bernstein, 2007).

People naturally move their heads when talking and in that rhythmic movement of the head transfers linguistic information. The obtained results point out that subjects identify a larger number of syllables correctly when natural movements of the head are present in the animation, than when they are distorted or eliminated. These results suggest that nonverbal gestures (such as head movements) play an important role in perception of speech (Munhall, Jones, Callan, Kurata & Vatikiotis-Bateson, 2004).

Goebel (2013) points out that conversation is the key to fostering and maintaining interpersonal relationships. When the auditory signal is degraded due to hearing loss, there are significant limitations and difficulties in communication. In that case, other communication strategies are used in order to understand the information. This study examines the effects of using context when lip-reading while listening (context from test sentences and situational context). The obtained results show that the context is used more through the visual than through the auditory channel. Deaf and hard of hearing people should use the remaining auditory capabilities in order to fill in the context, and it is certainly necessary to rely on visual perception in order to understand what was said.

A group of authors investigated whether the ability to speech read from the mouth can be improved at the age of 7 to 14 and whether hearing loss affects the development of the ability to speech read. What kind of a relationship there is between individual differences in lip-reading and the other capabilities was also investigated. The sample included 40 hearing children and 24 deaf children. The results indicate that the ability to lip read in children is not fixed, but it improves with age. Experience plays an important role in the development of this ability, and deaf children are better lip-readers than hearing children (Tye-Murray, Hale, Spehar, Myerson & Sommers, 2014).

Speech reading is a skill that deaf children need in order to have access to the language used to communicate in the community. They describe development of a new instrument, Test of Child Speech reading (TOCs) specially designed for use with deaf and hearing children. It is computer-based and it measures children's speech reading on three psycholinguistic levels; a) words, b) sentences and c) short stories. The aim of the study was to standardize the Test and to investigate the influence of the hearing condition, age and linguistic complexity on the ability to speech read. The study included 86 children with severe and very severe pre-lingual hearing impairment, and 91 hearing children, aged 5 to 14. The obtained results point out that speech reading skills improve with age in both groups of children. There is no influence of the hearing condition on the ability to speech read (Kyle, Campbell, Mohammed, MacSweeney & Coleman, 2013).

Oliveira, Soares & Chiari (2014) are, in their study, trying to identify the factors that influence the ability to speech read and comparing the ability to speech read in deaf and hearing persons. The authors conclude that examinees with pre-lingual hearing loss and those who have undergone the treatment of speech reading, perform better in speech reading tests than normal hearing examinees. Gender and education showed no influence on the ability to speech read. It was found that the vocabulary, the time when hearing loss occurred and speech reading treatment affect the ability to speech read.

What successful lip-reading depends on

Successful and high-quality speech reading from the interlocutor's mouth and face is possible if the following conditions are provided: ... properly placed lighting; the person who is speaking must have a clear, clean and correct pronunciation; speech must be distinct, clear, at first a little slower, but without exaggeration, chanting or chopping sentences; sentence length should be three to five words; the way of pronouncing should be normal; the rhythm of speech should be natural; head position should be normal; the hearing impaired interlocutor's attention should, from the very beginning, be focused toward the person who is speaking; the family should be educated to assist in speech reading; the time of beginning to speech read coincides with the communication that begins in the family since the early days (Dimić, 2002).

We can say that the ability to synthesize is the most important factor for successful lip-reading. This means that the person who lip read is prepared to receive limited information that he or she has seen on the face, to store and use it and to correctly identify the spoken message. Also, the amount of training contributes greatly to the improvement of speech reading. Jeffers & Barley point out that the biggest progress occurs after one to three years of training-depending on the individual (Dimić & Dimić, 2003).

Better knowledge of the language provides for better lip-reading. This means that knowledge of vocabulary, grammar, and everyday and idiomatic expressions, i.e. understanding the language, greatly facilitates the whole process. The ability to use context or rules of the language can be crucial for integration into the conversation being conducted. A good speech reader has to be motivated, confident, with a positive attitude towards speech reading.

We might expect people who have been deaf since birth to be better lip readers, because the use of the visual channel takes longer. However, better speech readers are those children who became deaf later on, especially if they had mastered their mother tongue. Also, hard of hearing people show better results in speech reading. We assume that this is because they have a better built structure of the language.

Flowers (2006) states that the ability to lip read improves with age, as well as with longer use of hearing aids. Hard of hearing children are exposed to the strategies of speech reading daily, if they are trained in an auditory – oral environment. In that way they are provided indirect speech reading training because teachers pay attention, to a great extent, to the position of the head and the shape and position of the mouth while speaking.

One more factor that affects successfulness in lip reading is visual ability. Visual discrimination and visual memory skills are part of the ability to synthesize and be flexible, because the visual model of speech has to be remembered in order for it to be able to be used.

Mohammed (2007) points out that for people with severe hearing impairments who use speech, speech reading is extremely important. These people use their hearing aids more to assist in speech reading than as a means to listen. People with moderate hearing loss rely, to a greater extent, on visual information.

Visibility of our language's phonemes

Our language's phonemes are very different in their visibility. We can hear more than 30 different phonemes, but a much smaller number can be distinguished visually.

The pronunciation of a phoneme is caused by various movements, position and contacts of speech organs. All parts of the face contribute to optical expression. The deaf person visually perceives the speech of the interlocutor at the same time activating his or her speech organs and in that way he or she forms motor habits for speech. So, the optical signals activate kinesthetic sensations on the basis of motor imitation, which supports understanding and development of voice speech. The phonemes of our language, in their location, are more or less visible. Vowels (vocals) are better heard, clearly visible (a, o and u), and some are more difficult to distinguish (i and e in particular). Consonants are of great importance for the understanding of meaning. They can be divided into those which are better seen (which are formed in the front part of the mouth), those which are partially visible and those that are almost not visible (formed in the interior of the mouth).

Depending on the place of being pronounced and sonority, as well as the presence or absence of nasality, visibility of phonemes is different. Voiced and voiceless sounds are replaced, which influences the reception and understanding of the meaning of the message. In the same way, the visibility of phonemes depends on their position and the place in words, as well as the previous and subsequent phoneme. Non-verbal context, as well as the overall situation in which the child is are significant for understanding speech.

Ostojić (2004) points out that knowing the context of the message facilitates perception. Words are much more easily perceptive when they are within a context where our knowing of language can facilitate recognition. Understanding the context of a sentence implies earlier experience, i.e. already fixed and learned acoustic images.

As a result of many consonants looking like other consonants (homophones), many words look alike. The right words are recognized on the basis of whether they make sense in a sentence or conversation. Homophone words make speech reading difficult (Dimić & Dimić, 2003).

Through the analysis of research conducted in the field of speech reading from the mouth (in our country: Savić, 1969; Dimić, 2002; Dimić & Dimić 2003), it was determined that a phoneme that is at the beginning of a word has the highest informative importance, the phoneme at the end of a word is less readable, and the most unreadable one is the one in the middle of a word. It happens that children read the first or the last syllable, but not the middle one. That confirms that a word is read as a whole, and not element by element.

However, in addition to speech reading from the mouth, it is necessary to enable a child to use even the smallest remains of hearing that may serve as a supplement to vision.

The best results in lip-reading are realized with the use of a hearing aid. It is an important communication strategy in people with impaired hearing (Dell´ Aringa & Dell´ Aringa, 2007).

The best way of learning speech is dual sensory or audiovisual way. Therefore, in speech development of a child with a hearing impairment, it is necessary to use sound amplifiers, as well, so that all of the remaining hearing is used.

Lip-reading at preschool age

Educational contents for children with hearing impairments predict that they are enabled to follow the speech of people around them so that they are able to participate in everyday communication situations.

Exercises at preschool age should be done through games by learning individual words, phonemes and sentences. In so doing, one should take care of the order and way of learning. Firstone needs to practice reading vowels, then visible consonants, then those less visible ones. Reading isolated phonemes should be avoided, unless they represent a separate word or sentence. The child should be trained to read an entire word, a sentence, to understand short commands needed in everyday life, to answer the questions. At the end of the preschool period, before starting school, it is necessary for the child to lip read all the words that have a higher frequency of use in everyday life, especially short commands. In further work they are trained to read more complex sentences with new messages (Isaković & Vujasinović, 2008).

In lip-reading training it is necessary to devote equal attention to all kinds of words. They are introduced in the order in which they are handled in normal speech – language development. It is certainly necessary to provide individual approach to every child and to monitor the capacity and capabilities of each individual. On the basis of this information, treatment is adjusted for each child, individually. Through games, at preschool age, every kind of learning is performed, and so is learning to speech read from the mouth and the face of the interlocutor. One always starts with objects, phenomena and events that are closest to the child, to which it is bound by positive emotions. After that, the contents are, according to age, extended to objects from farther environment, as well as the abstract notions that are always a bigger problem for deaf children. They are more difficult to acquire through the senses and evidence, therefore it is necessary to pay more attention to them.

In deaf and hearing impaired children of preschool age, through various spontaneous and directed activities, it is necessary to develop all the functions of verbal and non-verbal communication (Dimić, Kovačević, Isaković & Nestorov, 2010).

MATERIALS AND METHODS

The aim of our study was to determine the level of successfulness in lip-reading (words and sentences) in deaf and hard of hearing children of preschool age.

Sample

The sample consisted of 15 preschool children, 3-6 years old, who attend preschool groups at schools for deaf and hard of hearing in Belgrade.

The research was conducted individually, and the task was considered successful if the child repeated correctly or showed by sign (gesture) the word spoken by the examiner. When examining successfulness in lip-reading sentences the child was to show an adequate picture after the sentence had been said.

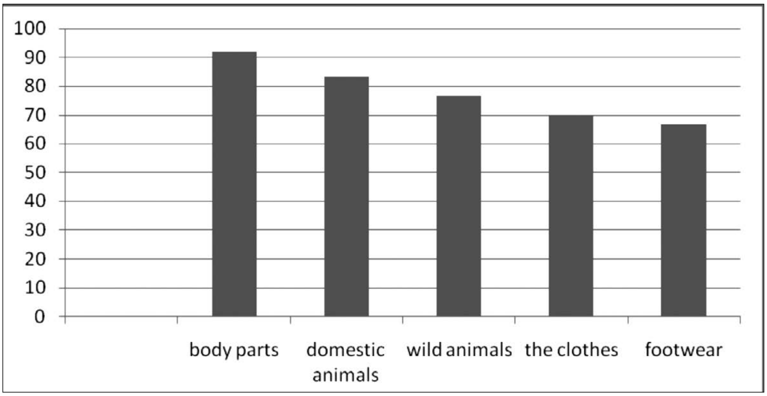
Instrument

We tested the successfulness in lip reading within different areas: body parts, domestic and wild animals, clothing and footwear, as well as lip reading the first adjectives, verbs and pronouns that appear at this age. We checked successfulness in lip-reading sentences which are related to the story “Gigantic turnip” through pictures.

Statistical methods

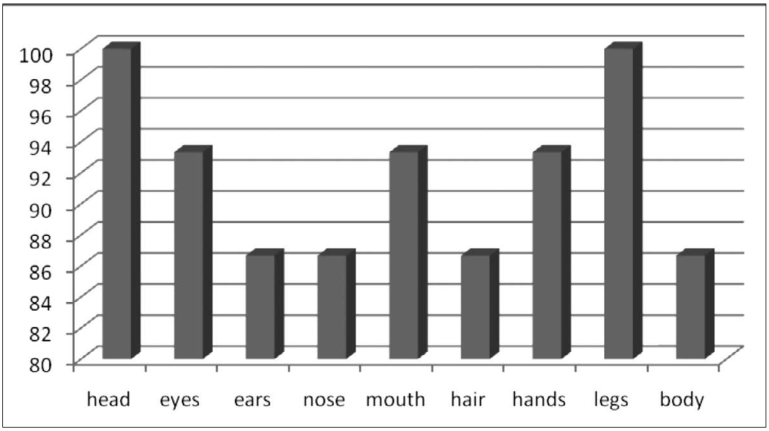
In the data analysis the following statistical methods and procedures were used: measures of descriptive statistics – percentages and frequency.

THE RESEARCH RESULTS WITH DISCUSSION



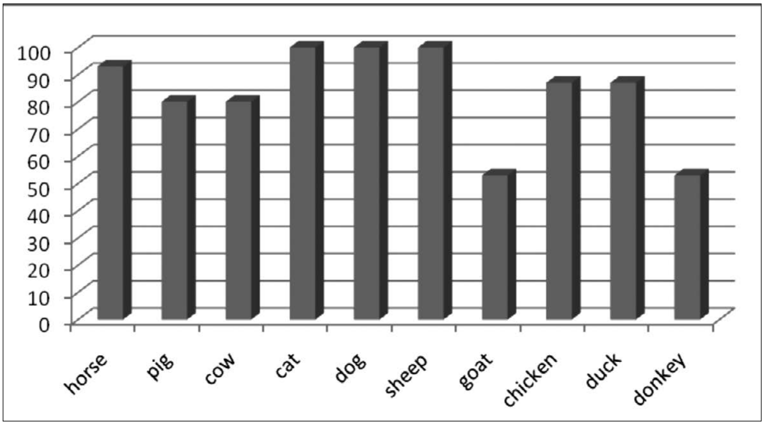
Graph 1 Success in lip-reading in different fields

Graph 1 presents the results of lip reading in 5 tested fields. The following fields were lip read the best: *body parts*, and *domestic animals*. Terms from the field of *clothing and footwear* were lip read a bit less well.

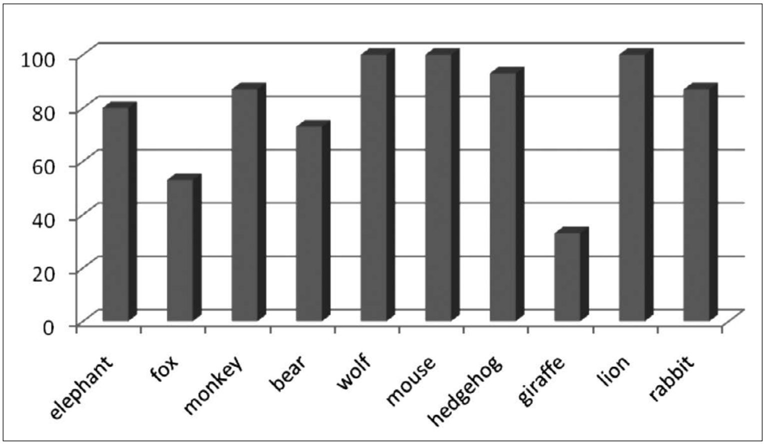


Graph 2 Success in lip-reading in the field of body parts

In Graph 2 the results of lip-reading the main parts of the body are presented. The best results were achieved in the perception of terms *head* and l*egs*, and the weakest in lip-reading terms *ear, nose and hair*. Some of the mistakes in lip-reading lips are: uvo (ear) – ovo (this), kuvar (a cook), ovor; nos (nose) – mos, bos (barefoot); kosa (hair) – gosa, osa (wasp). Given that the achieved results are over 86%, for all parts of the body we think that children are well integrated and have a sense of themselves and their bodies.



Graph 3 Success in lip-reading in the field of domestic animals

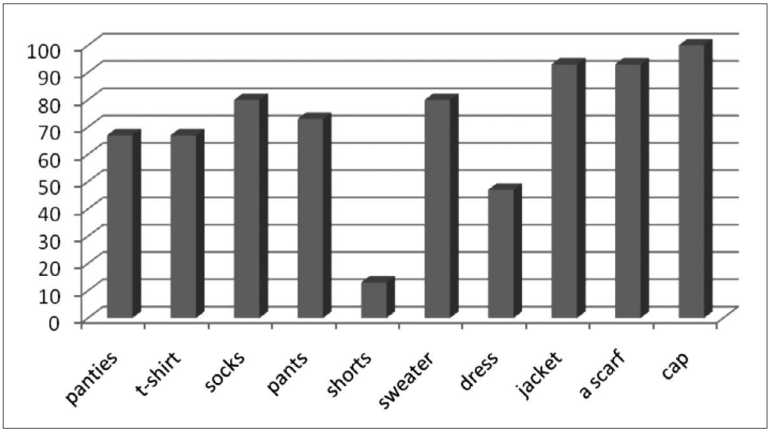


Graph 4 Success in lip-reading in the field of wild animals

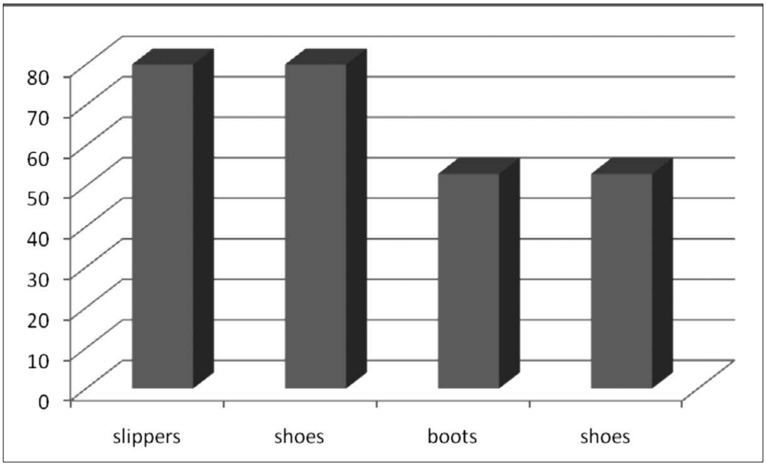
In Graphs 3 and 4 students' results in the fields of domestic and wild animals are presented. Better results were achieved in lip-reading terms in the field of domestic animals (88.3%), while terms from the field of wild animals (76.4%) were lip read somewhat less well.

In the field of *domestic animals* the terms that were lip read best were *cat, dog and sheep* (100%), then the terms *horse, chicken and duck*. In teaching children one starts right from these terms, which are first adopted through onomatopoeia. The worst lip read terms were *goat and donkey*. The term *koza* (goat) was lip read as *osa* (wasp), *hosa, kosa* (hair), *rosa* (dew), *kosta, koska* (bone), *inosa*; and the term *magarac* (donkey) as *bagas, magac, magarasa*.

In the field of *wild animals* the best lip read terms were *wolf, mouse and lion* (100%), then *hedgehog, monkey and rabbit*. These are terms that children encounter in the context of the first songs and fairy tales that are taught. The terms lip read in the worst way were *fox and giraffe* (which are not taught through onomatopoeia). The word *ze*c (rabbit*)*–was lip read as zek, ses, zet (son-in-law), zid (wall), *šes, des*; *miš* (mouse) – *pš, piš, biš, muš*; *žirafa* (giraffe)– *žirava, čijava, sivara, širava, živa* (alive, mercury)*, žiljava, šljiva* (plum)*, šisa.*



Graph 5 Success in lip-reading in the field of clothing



Graph 6 Success in lip-reading in the field of footwear

In Graphs 5 and 6 the results of lip-reading in the fields of *clothing and footwear* are presented. Slightly better results were achieved in the field of *clothing* than in the field of *footwear*. Best read terms were *cap, jacket, scarf*, while the term *šorc* (shorts) was lip read in the worst way. It was lip read as *šors, šos, sors, sosa*; and the word *haljina* (dress) was lip read as *aljina, Galina, anina* (Anna's). In the field of *footwear*, terms *slippers and shoes* were lip read better than *boots and shoes*. The word *cipele* (shoes) was lipread as *ipele, smala, zmelje, čiper, sipete, cmela, tiple, sipedi*. Results obtained within this area suggest that names of clothes which are more frequently used are lip read better.

The first adjectives that appear at pre-school age are *sweet, salty, beautiful, ugly, clean, dirty, healthy, sick.* Adjective *beautiful* is lip read best, while the adjective *zdrav* (healthy) is lip read in the worst way (difficulty being represented by consonant set zdr, as well as insufficient frequency of use of the above adjective in children's communication).

The first verbs that appear at pre-school age are put on, take off, put on (shoes), take off (shoes), eat, drink, go, run, sit, sleep, drive, play, give (me), here you are. The verbs that are lip read best are *eat, drink, sleep, here you are* (which are also used most often), those lip read in a slightly worse way are the verbs *take off (shoes) and take off (clothes*); lip readability of these words is bad, and they are not enough in use in everyday situations. The word *izuti* (take off – shoes) was lip read as *zuti, zati, iteti, isuti*; and *svući* (take off – clothes), a*šuci, scuci, vuci* (pull).

Pronouns *I, you, my* were successfully lip read by all the children, while they perceived the pronoun *your* slightly worse. The tested pronouns are short and used very frequently in everyday communication, and we believe that that's why lip-reading them was not a problem for the children.

When lip-reading sentences from the story "Gigantic turnip" it was observed that the first, the second and the third sentence are lip read better, and problems arise when reading the fourth sentence. The first and the second sentence (Grandpa is pulling the turnip. Grandma, brother and sister are helping grandpa.) were lip read successfully by all the children. The third sentence (Grandpa, Grandma, brother, sister, the dog, the cat and the mouse are pulling the turnip.) were lip read slightly worse, while the fourth sentence (They pulled out the turnip.) was lip read with a success rate of 40%. The problem in the perception of the shortest and the simplest of sentences was the pronoun, as well as the verb that are still not well consolidated at this age.

The results indicate that the point of the story was not actually adopted (the pronoun *they* and the verb *to pull out*). The other sentences were effectively perceived according to their length and the terms used in them are used very frequently in everyday communication.

CONCLUSIONS

Successfulness in lip-reading at preschool age is greatly affected by visibility (readability) of phonemes of our language, but also, to a large extent, by the degree of knowledge of terms in speech and sign language. Adequately adopted and stable terms are lip read well, even when the visibility of phonemes they are made up of is lesser. Poor visibility of fricatives (s-z, š-ž, h), affricates (c, ć-đ, č-dž), and velar phonemes (k and g) in words makes it difficult to recognize the terms on the lips. However, we have noticed that well-established terms, as well as those that are frequently used and with which the children have had experience, even despite poor readability, present no problem when lip reading.

The importance of application of onomatopoeia in learning speech and adopting the first words has been observed. The terms that are mastered through onomatopoeia are lip read better (within the field of *animals*) than those for which there is no onomatopoeia. Also, we must emphasize the importance of the first songs, fairy tales and fables which are taught at the earliest age (precisely the names of the characters from the first stories are recognized the best).

The importance of early knowledge of sign language facilitates the adoption of terms, as well as lip-reading. Many children have corresponded with an adequate sign to the spoken term and showed a higher level of understanding of the spoken words than children who didn't use signs (gestures). It was also observed that readability (recognition) is better for terms for which there is a sign – a gesture in sign language (that can be observed in the field of knowledge of the first adjectives and verbs), than where one character (gesture) signifies a number of similar terms. When lip reading sentence, the children perceived the length of sentence and recognized individual terms, while giving adequate answers from the contexts of images.

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SENSORY PROCESSING IN CHILDREN WITH DEVELOPMENTAL DISABILITIES[a]

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SUMMARY

Mutual integration of different sensory information enables interpretation of environmental stimuli. In children with developmental disability inadequate sensory processing is present in various degree. Emersion of sensory processing difficulties is dominant at earliest of age, so early detection is extremely important for rehabilitation treatment.

Aim of this research is to determine at which part of sensory processing, difficulties occur in children with developmental disabilities, and whether there is a difference in sensory processing between children with autism spectrum disorder (ASD) and in intellectually disabled children (ID).

Sample consisted of 61 examinee age four to six, both genders, divided in two groups. First group consisted of 42 examinees with ASD, and in the second group consisted of 19 ID children. Excluding criteria for forming the sample was existence of other medical or psychological diagnosis, neurological diseases and sensory damages.

Short sensory profile was used for acquiring the data necessary for screening of sensory processing difficulties (The Short Sensory Profile, Dunn, 1999).

In research results difficulties in certain aspects of sensory processing in children with ASD and in ID children are shown through percentage. In all instruments of subtest, more frequent sensory processing difficulties occur in children with ASD than in ID children. The difference in arithmetic mean between children's scores with ASD and children's scores with ID on screening of sensory processing difficulties is existent and it is statistically relevant (t=3.544, df=59, p=0.001).

Key words: sensory processing, intellectual disability, autism spectrum disorder

INTRODUCTION

Sensory processing is a complex neurobiological process in which individual using his senses, perceives information or stimulations from environment, sending the data to appropriate reception and processing center and responds to environmental stimuli (Parham & Mailloux, 2015). Sensory processing is developmental process and it is extremely important during first 10 years of child's life (Baranek et al., 2006). Children of typical population do not have problem in perceiving and processing outer stimuli,

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while children with mental disabilities respond to sensory experiences differently than children their age without mental difficulties. Initial detection of sensory processing reports often perceives clinical diagnosis (Ausderau et al., 2014).

Children with mental development difficulties can paradoxically react to certain sensory stimuli, being sometimes hypersensitive, sometimes hyposensitive to different information (certain sound, touch, pain, taste or smell). Sensory specifics are very prevalent in autism spectrum disorders (ASD) (Ben-Sasson et al., 2009a; Ben-Sasson et al., 2009b). Studies have proven greater sensory specifics in children with ASD than sensory specifics in intellectually disabled (ID) children (Baranek et al., 2006; Baranek et al., 2013). Difference in sensory processing in children with ASD and ID children are qualitative and they often represent a key part in making distinctions in behavior between these groups (Gal et al., 2010). During some research, it was detected using instruments, heterogeneity of sensory patterns in children with ASD (Goodman-Scott & Lambert, 2015), as in children with ID (Engel-Yeger et al., 2011), therefore it is necessary to evaluate specifics of sensory functions in children with mental disabilities and facilitate diagnostic procedure.

Most evidence that indicate difficulties in sensory processing are related to statements from parents, retrospective analysis of videos made in agreement with parents by experts and therapist reports. In literature, frequency of sensory processing disorder in children with ASD is in range from 42% to 95% depending on sensory dimension or questioned area (Baker et al., 2008; Chen et al., 2009; Leekam et al., 2007). Research show that in more than 70% of children with ASD sensory modulation disorder is described which influences on every sensory system (Tomchek & Dunn, 2007). In ID children frequency of sensory processing disorder was 38% during one research (Baranek et al., 2006).

Incorrect registration of sensory stimuli is characteristic for children with sensory processing disorder in responsible areas of brain sphere, hence they pay no attention to most of stimuli, or, in other case, overreacting to those stimuli (Biel, 2014).

Auditory and visual stimuli are "ignored" without tendency or they are significantly unregistered more than other kind of stimuli (Gladding, 2015). Children with ASD usually do not pay attention to everyday stimuli, like sound of bell or other noise and often do not "hear" when they are spoken to. Also, they have not developed the habit for unvaried continuous sound, which they cannot ignore, so they pay more attention to this kind of stimuli. Child with ASD may react with panic to the sound of vacuum cleaner, motor bike or other intensive sounds. But also, loud sound may create painful auditory stimuli in children with ASD (Lang et al., 2012).

Children with ASD may seem to visually ignore their environment. They look "through" people and avoid eye contact. Often, pay no attention to toys, but some details can draw their attention (spot on the floor) (Matsushima & Kato, 2013).

Brain has difficulty in discerning which information is relevant, and which one is not in children with sensory processing disorder (Parham & Mailloux, 2015). These persons have difficulties with localization of tactile stimulation, and for them it is difficult to determine position of their hands if they cannot see them (proprioceptive sensations) (Schneider, 2016). Children with ASD have great difficulties with motoric planning, which is manifested as inability to mimic certain body position. Even though postural reaction in these kind of children are not developed correctly, they are often better than reaction which ID children express (Joosten & Bundy, 2010). This implies that brainstem in child with ASD is processing proprioceptive and vestibular stimulation which are necessary for postural reactions. Other aspects or dimensions of sensory processing which are not functioning correctly are causing the problem (Lang et al., 2012).

Children with ASD also have problem with registering other kind of stimuli. Scent is not registered and sense of taste is poorly developed for most of these children. Also, absence of reaction to pain or physical injuries may occur. However, some of the children are oversensitive to content of their meal, and refusing certain type of food for its texture. They can unusually react to stimuli of moderate intensity, like clear light and touching. Very strong pressure is the kind of tactile stimuli which is always causing positive reaction to children with ASD (Yasuda et al., 2016).

Child with ASD feels stimulation from muscles and joints better than with their eyes and ears. Stereotypic movements of hands and legs stimulate receptors in joints and muscles, which is causing sense of pleasure. These children either persistently ask for movement and vestibular stimulation, or completely refuse them. Desire for profuse movement in children with ASD occurs from feeling great satisfaction which that movement creates. Movements around their axis and rocking does not create vertigo or nausea in these children, which is indication that brain of these children is not responding to vestibular stimulation as it was supposed to (Watling, Deitz & White, 2001). In ID children long term movement around their axis does not create pleasant feeling and this kind of motion lasts much less than in children with ASD (Watson et al., 2011).

Behavior in children with ASD is inconsistent. Sometimes there can be a reaction to certain stimuli, and then the next day there will be no reaction to same kind of stimuli. It may seem that the child is stubborn and that it does not want to notice or react on purpose. However, because of the way that brain functions in children with ASD, child cannot perform consistently on daily basis. Often, with appropriate special treatment, child with ASD may learn motivation for registering certain sensory stimuli. Sensory integration treatment seeks to provide appropriate stimuli, to motivate the child and to process other sensory stimuli with contentment, especially visual (Gourley et al., 2013; Miller et al., 2007).

Brain capacity in children with sensory processing disorder, beside that it is missing to register certain sensory stimuli, it also fails to modulate them, especially vestibular and tactile stimuli (Owen et al., 2013). Large number of children with sensory processing disorder refuses movement and they are gravity unstable, because they cannot modulate sensory stimuli from vestibular center (Watson et al., 2011). Some children with sensory processing disorder get upset if someone tries to flip them upside down, to raise them high or to put them in unusual position, which indicates that relation to gravity and space is damaged (Wickremasinghe et al., 2013). However, that kind of gravitational insecurity is indicator for therapist that the child is registering certain kind of stimuli, which can provide better treatment.

Since children with sensory processing disorder are inefficiently observing stimuli from environment, information from skin, muscle and vestibular center, they cannot develop clear perception of their bodies. So, the focus in child's treatment should be the body.

Different sensory information that brainstem receives travels to thalamus, and then to cerebral cortex which is enabling more complex aspects of interpretation of these information. Vestibular stimuli, along with proprioceptive and other sensory stimuli are being processed in higher cognitive centers and they are enabling positioning of one's body in space after which motor region exercise muscle movements (Owen et al., 2013). Disorder in this area makes child activities more difficult. Child will have a problem to simultaneously manipulate larger number of objects and sorting those objects in space. Adequate reception of visual information could not be possible without vestibular system, and it is known that this system is developed in line with hearing, with whom it "shares space" in inner ear and it's sending impulses through unique nerve to brainstem (Adams et al., 2015).

None of brain function cannot perform well if the brain does not receive or process the sensory experiences of the vestibular system. If child has vestibular system disorder, disorganization of sensorimotor system will occur (Bayat, 2015).

When a child has reduced sensory processing within the vestibular system, learning disabilities can manifest themselves through the difficulties of monitoring objects in front of the eyes, shifting gaze from one point to another, etc. There may be problems which are affecting process of drawing and scribbling (Glennon et al., 2012). These difficulties are manifested also when starting and doing physical and manual activities (Goodman-Scott & Lambert, 2015), so, it may be manifested, for example, as difficulty while playing with ball or other play activities.

People handle visual information at two levels. At the level of the brainstem vestibular stimuli, proprioceptive stimuli from the eyes, neck and body and visual stimuli are united in a complex sensory process. Based on that, "map" is created (basic rough complex), which is used for the successful guidance of the body through space. Feelings integrated in the brain stem travel to cerebral hemispheres, were next, more complex level of processing is focused more on details. Hemispheres are responsible for intentional view direction. For normal functioning constant communication and cooperation is necessary between these two systems (Wickremasinghe et al., 2013).

Inadequate communication between visual, vestibular, proprioceptive and tactile system may result in poor visual discrimination (Schneider, 2016).

Auditory processing is done on two levels, as well as visual. At the level of the brainstem auditory stimuli are associated with vestibular, proprioceptive, tactile sensations and vibrations. This level forms the basis of more complex functioning of auditory processing, which, like speech and language, is resting on the processes in cerebral hemispheres (Leekam et al., 2007; Lin et al., 2012).

Adequately developed language and speech imply good sensorimotor basis on a lower level of processing and harmonious functioning of all parts of the brain, as well as their good cooperation (Watson et al., 2011).

The purpose of the therapy in children with ASD and ID children is to improve sensory processing, in order for stimuli to be more efficiently registered and modulated with proper organization of sensory dimension treatment including motivation and incentives.

Aim of this study is to determine in which the dimension / field of sensory processing most common problem is occurring in children with developmental difficulties, and whether there is a difference in sensory processing in children with ASD and ID children in certain sensory areas.

METHOD

Sample

Sample consisted from 61 examinees age four to six (AS=5.46; SD=0.78), both genders, divided in two groups. First group consisted of 42 examinees diagnosed with ASD (68.9% of the sample), while other group consisted of 19 ID children (31.1% of the sample). In the sample, presence of boys is significantly more prevalent (46 examinees or 75.4%) than girls (15 examinees of 24.6%). Disproportion in number of boys and girls in this study is noticeable, which can be explained by the prevalence of boys with clinical picture of ASD. Excluding criteria while forming the sample referred to the existence of other medical or psychiatric diagnosis, neurological diseases and sensory impairments.

Tables 1, 2 and 3 are showing that presence of six-year-old is dominant in both questioned groups. In all institutions in Belgrade for preschool children in which data is acquired, the most numerous are six-year-old, while younger children are in lesser number.

Table 1 *Distribution of examinees in relation to age*

4 years	5 years	6 years
11 (18%)	11 (18%)	39 (63.9%)

Table 2 *Distribution of examinees with ASD in relation to age (AS=5.48; SD=0.74)*

4 years	5 years	6 years
6 (14.3%)	10 (23.8%)	26 (61.9%)

Table 3 *Distribution of ID examinees in relation to age (AS=5.42; SD=0.90)*

4 years	5 years	6 years
5 (26.3%)	1 (5.3%)	13 (68.4%)

Instrument and procedure

In collecting the data for screening sensory processing difficulties Short sensory profile is used (The Short Sensory Profile, Dunn, 1999).

This thirty-eight item instrument is designed for children ages 3 to 10. Scoring system uses five-degree Likert scale (1-5). Points are assigned according to the frequency of a behavior, ranging from 1 for “never” to 5 for “always”. This instrument performs screening of difficulties through area or dimensions of sensory processing, forming seven subscales: Tactile sensitivity, Taste and smell sensitivity, Sensitivity to movement, Under responsive sensations, Auditory filtering, Weakness of body and energy and Visual and auditory sensitivity. In detecting sensory processing difficulties, it is possible to use each subscale separately, but the author of the instrument is advising that total score should be used, because it is the most sensitive indicator of sensory dysfunction. While filling out this instrument, apart demonstrating certain stimulus in a child, special education teacher who is spending time daily with the child is consulted, and written parental statements have been used about the presence or absence of certain sensory sensation. All parents gave their written consent to the child's participation in this study. Regarding recommended standard, it is possible to distinguish three groups of reactions (indicators) related to sensory processing: a group of typical performance (without difficulty), group with possible difficulties and group with definitely perceived sensory processing difficulties.

Research was conducted in a sample of kindergarten children who attend regular or developmental kindergarten groups, as well as in pre-school groups in elementary schools that are educating students who have problem in mental development. All institutions are on Belgrade city territory. Research was conducted continuously, without pause, in autumn/winter of 2015/2016.

Data processing

During statistical analysis following statistical procedures were applied:

- Standard descriptive statistical parameters: the arithmetic mean, standard deviation, frequency and percentages;
- For categorical data independent T-test was used to test the statistical significance of differences between groups.

RESULTS

Table 4 presents percentage scores in every subscale of instrument Short sensory profile. It can be noted that 81% of examinees with ASD are expressing very perceived sensory processing difficulties in the field of tactile sensitivity, while in half of that percentage of ID examinees a definite problem in specified dimension of sensory processing is detected. Results indicate that the remainder of examinees with ASD are also showing a tendency towards possible problems in the field of tactile sensitivity, and that neither one examinee with ASD was detected, that is expressing none of difficulties in this dimension. Possible problems in sensory processing in tactile sphere is registered in 47% of ID children, while two examinees registered no problem in processing these kind of stimuli.

Results on subscale, Sensitivity of taste and smell, indicate that in both groups of examinees definite problem is detected in processing these sensations in a very similar percentage (at about three quarters of the examinees). Seven examinees with ASD are indicating possible problems in sensory processing of taste and olfactory stimuli, while almost a third of ID examinees had no problem in processing these kind sensations.

Half of examinees with ASD demonstrate a definite sensitivity to movement, while quarter of them exhibit behavior that can be interpreted as potential issues. A quarter of the same group does not manifest difficulties while changing body position. Slightly more than half of ID examinees are expressing definite problem while changing body position, while 42.1% of examinees have a certain degree of sensitivity to movement which is typical for regular population.

Tendency to certain identification of under responsive sensations is recorded on 95.2% of examinees with ASD and 89.5% of ID examinees. In neither group examinee which did not exhibit at least some under responsive sensation was not detected.

Auditory filtering is a subscale in which highest percentage of registration deficit is recorded, as 95.2% of children with ASD exhibit a definite problem in this part of sensory processing, while 84.2% of ID examinees from the sample shows this level of problem.

Weakness of the body and lack of energy exhibit half of children with ASD, and ID children are expressing same problems in more than half of examinees. More than third of ID children are indicating possible problems in weakness of the body and the lack of energy, while nearly a quarter of examinees with ASD do not exhibit any weakness in body construction.

All examinees with ASD are expressing a definite (81%), or potential problem in field of visual and auditory sensitivity, while in 63.2% of ID examinees a definite problem in this area is detected. However, 10.5% ID examinees show no difficulty in processing visual or auditory stimuli.

Total score, as the most sensitive indicator of sensory dysfunction, shows that in 75.2% of examinees with ASD and 62.4% of ID examinees problems in sensory processing is definitely identified. Possible problem with these abilities have been noted in 16.7% of examinees with ASD and in 23.3% of ID examinees, while 14.3% of ID children and 8.1% of examinees with ASD processes sensory data as well as typical population.

Table 4 *Percentile score on Short sensory profile subscales*

	Typical performance n (%)	Possible problems n (%)	Definite problems n (%)
ASD	none	8 (19.0)	34 (81.0)
TS ID	2 (10.5)	9 (47.4)	8 (42.1)
ASD	4 (9.5)	7 (16.7)	31 (73.8)
TSS ID	6 (31.6)	None	13 (68.4)
ASD	10 (23.8)	11 (26.2)	21 (50.0)
SM ID	8 (42.1)	5 (26.3)	6 (31.6)
ASD	None	2 (4.8)	40 (95.2)
URS ID	None	2 (10.5)	17 (89.5)
ASD	None	2 (4.8)	40 (95.2)
AF ID	None	3 (15.7)	16 (84.2)
ASD	10 (23.8)	11 (26.2)	21 (50.0)
WBE ID	1 (5.3)	7 (36.8)	11 (57.9)
ASD	none	8 (19.0)	34 (81.0)
VAS ID	2 (10.5)	5 (26.3)	12 (63.2)
ASD	3 (8.1)	7 (16.7)	32 (75.2)
TOTAL ID	3 (14.3)	4 (23.3)	12 (62.4)

Legend: Tactile sensitivity (TS), Taste and smell sensitivity (TSS), Sensitivity to movement (SM), Under responsive sensation (URS), Auditory filtering (AF), Weakness of body and energy (WBE) and Visual and auditory sensitivity (VAS), autism spectrum disorder (ASD), intellectual disability (ID)

Difference of 1.63 points between average scores of examinees with ASD and ID examinees on subscale Tactile sensitivity is at significance level of 0.01 and it is shown in

Table 5. Based on results it can be concluded that subjects with ASD exhibit significantly greater difficulties in processing tactile sensation than it is the case with ID examinees.

Table 5 *Comparison of average scores in examinees with ASD and ID examinees on Tactile sensitivity subscale*

TS	N	Mean	SD	Std. Error mean
ID	19	3.84	2.58	2.59
ASD	42	5.47	2.09	0.32

Legend: Tactile sensitivity (TS) t=2.617, df=59, **p=0.011**

Average score of two groups on sensitivity of taste and smell subscale are shown in Table 6. Difference between average scores of examinees in this subtest is not statistically significant, although slightly higher score is detected in examinees with ASD who are indicating pronounced difficulties in processing taste and olfactory stimuli.

Table 6 *Comparison of average scores in examinees with ASD and ID examinees on Taste and smell sensitivity subscale*

TSS	N	Mean	SD	Std. Error mean
ID	19	4.05	3.15	0.72
ASD	42	4.78	2.66	0.41

Legend: Taste and smell sensitivity (TSS) t=0.939, df=59, p=0.351

Results obtained in Table 7 show that difference between average scores of examinees with ASD and ID examinees on subtest Sensitivity to movement is not statistically significant. Even though a difference of 0.49 points is registered, it is not at the required level of statistical significance. Thus, both groups of examinees in this sample exhibit same problems when changing body position.

Table 7 *Comparison of average scores in examinees with ASD and ID examinees on Sensitivity to movement subscale*

OP	N	Mean	SD	Std. Error mean
IO	19	1.89	2.10	0.48
ASP	42	2.38	1.91	0.29

Legend: Sensitivity to movement (SM) t=0.891, df=59, p=0.379

Data analysis found, while screening under responsive sensation, that there was no significant difference in scores between examinees with ASD and ID examinees. Need and tendency under responsive sensations equally exhibit both groups. This minimal difference in scores is presented in Table 8.

Table 8 *Comparison of average scores in examinees with ASD and ID examinees on Under responsivesensation subscale*

PS	N	Mean	SD	Std. Error mean
ID	19	7.10	2.88	0.66
ASD	42	8.09	3.22	0.49

Legend: under responsive sensation (URS) t=1.147, df=59, p=0.256

According to results presented in Table 9 it is concluded that children with ASD are manifesting significantly more difficulties in auditory filtering than it was the case with ID children. Difference in these scores is at required level of statistical significance.

Table 9 *Comparison of average scores in examinees with ASD and ID examinees on Auditory filtering subscale*

AF	N	Mean	SD	Std. Error mean
ID	19	6.05	2.39	0.54
ASD	42	7.69	2.54	0.39

Legend: Auditory filtering (AF) t=2.372, df=59, **p=0.021**

Table 10 provides an overview in average achievement of ID examinees and examinees with ASD within Weakness of body and energy subscale. Average score of ID children on this subscale is 4.26 points, and score of children with ASD in the same part of screening instrument was 3.54 points on average. It is noted that there is no statistically significant difference in scores of these two groups, although ID children show a greater degree of weakness of body and energy.

Table 10 *Comparison of average scores in examinees with ASD and ID examinees on Weakness of body and energy subscale*

WBE	N	Mean	SD	Std. Error mean
ID	19	4.26	3.66	0.84
ASD	42	3.54	3.37	0.52

Legend: Weakness of body and energy (WBE) t=0.747, df=59, p=0.458

Reviewing Table 11 it was found that children with ASD showed significant difficulties in processing visual and auditory sensations compared to ID children, were statistically significant difference in significance level is found 0.011 (t=2.615). Reliability of such a conclusion is 99%.

Table 11 *Comparison of average scores in examinees with ASD and ID examinees on Visual and auditory sensitivity subscale*

VAS	N	Mean	SD	Std. Error mean
ID	19	3.26	2.18	0.50
ASD	42	4.85	2.21	0.34

Legend: Visual and auditory sensitivity (VAS) t=2.615, df=59, **p=0.011**

Finally, Table 12 present a total score of examinees with ASD and ID examinees on sensory processing difficulty screening instrument. Examinees with ASD achieved on average 0.32 points more than ID examinees in all areas of the Short sensory profile. This difference is on statistically significance level of 0.001. We conclude that examinees with ASD show significantly more difficulties while processing sensory stimuli compared to ID examinees.

Table 12 *Comparison of average scores in examinees with ASD and ID examinees in Short sensory profile*

SSP	N	Mean	SD	Std. Error mean
ID	19	2.63	0.49	0.11
ASD	42	2.95	0.21	0.03

Legend: Short sensory profile (SSP) t=3.544, df=59, **p=0.001**

DISCUSSION

Results of this study suggest that children with ASD in 95.2% of cases exhibit under responsive sensations which are manifesting in enjoying strange sounds, insisting on movements that interfere with work in a kindergarten, in touching people or objects for tactile satisfaction and similar. Also, 95.2% of children with ASD are indicating definite problems in auditory filtering sphere and in this area highest percentage of registration deficit is recorded. In areas of tactile, visual and auditory sensitivity strong deficits are also detected, as 81% of children with ASD are demonstrating confirmed problems in processing of such stimuli.

In group of ID children 84.2% of them are expressing problem in auditory filtering which is manifested as problem in functioning if there is much noise in the environment, there are difficulties in sustaining attention, lack of reaction when invoking the name. In group of ID children89.5% of them in this sample are expressing the need for under responsive sensations.

Foreign research in which the same instrument is applied in population of children with ASD and ID children, are showing similar percentiles like this research, especially in field of under responsive sensations and auditory filtering (Baranek et al., 2006; Baranek et al., 2013; Tomchek & Dunn, 2007).

Comparing average scores on each of subscales for both groups of children following conclusions is reached: examinees with ASD exhibit significantly greater difficulty in processing tactile sensation than it is the case ID examinees, children with ASD have shown significantly greater difficulty in auditory filtering than ID children and children in with ASD significant difficulties the processing of visual and auditory sensations are detected comparing ID children.

Looking at the total score on the applied profile, given, that it is the most sensitive indicator of sensory dysfunction, it was found that examinees with ASD in general, show significantly more difficulties in processing sensory stimuli (75.2%) compared to ID examinees (62.4%).

And this result has reached the confirmation in previous studies with similar goals (Adams et al., 2015; Ausderau et al., 2014; Ben-Sasson et al., 2009b; Engel-Yeger et al., 2011).

Many researchers in this field criticize preschool system because it is expected from children to sit still in kindergarten and thus be deprived of vestibular, proprioceptive and tactile stimulation (Goodman-Scott & Lambert, 2015). Only mutual integration of different sensory information enables interpretation of stimuli from the environment. This is especially important for children with ASD and ID children. For example, there is one type of visual stimuli that attracts attention of majority of children with ASP. These are so called “moving stripes”. In front of the eyes of a child white and colored stripes are shown which are triggering “optokinetic nystagmus” (movement of the eyes caused by visual stimulant), which in turn stimulates vestibular nuclei. It is believed that stimulation of vestibular nuclei is helping the brain to register visual stimulant and make his meaningful for the child (Gourley et al., 2013).

Development of proprioceptive system has enabled for it to take over certain functions of vestibular system, which creates more efficient vestibular stimuli. A lot of muscle contraction and joint work enables more efficient sensory input which inhibits excessive vestibular activity (Lang et al., 2012). Therefore, for children with sensory processing disorder it is significant to perform activities such as pushing, pulling, lifting and carrying heavy objects and similar. Besides impulses that are sent in this manner along the spinal cord, muscles and joints are simultaneously sending proprioceptive information up to the vestibular nuclei and cerebellum, while cooperation between multiple centers is allowed, as well as consistent and accurate body movement (Miller et al., 2007). If integration of this information is not consistent, the child will often stumble and or it will be clumsy and likely to avoid physical activity (Parham & Mailloux, 2015). Without play, child will not get enough sensory stimuli which will affect its development of nervous system as a whole. Vision, hearing and speech can naturally look neglected in sensory integration therapy because they are considered as a final product of basic mechanisms. Acting on these basic processes, especially in the vestibular, proprioceptive and tactile functioning, with special treatment it is possible to create a good basis for the development of sight, hearing and speech (Walbam, 2014).

Main limitation of this study relates to including a convenient sample of which is bound to only one region in Serbia. Numerous sample with the same or similar objectives of the research could offer clear differences in sensory responses of different clinical pictures in the context of mental development difficulties. Studies with numerous sample have greater statistical power in answering to relevant questions of sensory processing. Furthermore, conclusions regarding sensory processing have not been obtained in direct longitudinal observation, but in a shorter observation of the child through a statement of special education teachers and parents. In later studies it is possible to define models of sensory processing in children with developmental difficulties.

INSTEAD OF CONCLUSION

As already mentioned, differences in sensory modulations in children with developmental difficulties are well supported in the literature, and findings of this study are joint to available evidence. Sensory processing skills play a significant role in variability of developmental performance in children with developmental difficulties. Recognizing contribution of sensory processing as a component of development in children with ASDP and ID children can significantly direct intervention plan in preschool.

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SYNTACTIC PERFORMANCE IN CHILDREN WITH COCHLEAR IMPLANTS

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SUMMARY

Purpose: This study examined the use of syntactic structures and their appearance in children with prelingually hearing impairment, amplified with cochlear implants.

Method: It included 25 deaf children with cochlear implants, 25 children with hearing impairment, amplified with hearing aids and 25 children with normal hearing, aged 4+ to 8.0. Syntactic performance was assessed by a battery of speech and language test: "Linguistic Evaluation of Individual Components of Dysphasic Syntax", with test consisted of five pairs of content-related images (picture stories).

Results: Children with cochlear implants presented a proper course of language development and production of simple, compound and complex sentences. However, a significant age-related delay is observed. During the first year of rehabilitation, children with cochlear implants did not use sentences. Simple sentences were first noted during the second, compound sentences during the third and complex sentences during the four year of hearing age and rehabilitation.

Conclusion: Children with cochlear implants showed positive progress in acquiring the language. Important factors that influence the syntactic performance are hearing age, duration of rehabilitation and degree of hearing impairment.

Key words: hearing impairment, rehabilitation, language development, grammar

INTRODUCTION

A cochlear implant is a sophisticated electronic device that compensates for the damaged hair cells in the inner ear. It takes over the role of mechano-electric transduction and delivers a processed signal to the auditory nerve. The electrical signal directly stimulates auditory nerve fibers via electrodes placed in the inner ear, and the process of signal transmission is virtually identical to the physiological process (Komazec, Dankuc, Vlaški, Lemajić-Komazec, Nedeljkov & Sokolovac, 2007).

Standard procedure of evaluating candidacy for cochlear implantation in children in The Clinical Center of Vojvodina, Ear, Nose and Throat Clinic in Novi Sad includes an assessment by ENC specialist, audiologist, speech and hearing therapist and psychologist. Candidacy is based on a number of factors, including the degree of hearing loss, verification of limited benefit from conventional amplification and no medical contraindication. Candidates for cochlear implantations are children with sensoryneural hearing loss, more than 80 dBnHL on both ears. From a surgical point of view, the child's suitability for cochlear implantation is determined by a computed tomography scan of the temporal bone. If necessary, brain magnetic resonance imaging and a neurological examination are performed in order to rule out any central nervous system disease that may complicate the expected results of the intervention (Komazec et al., 2007; Sampaio, Ara´ujo, Carlos & Oliveira, 2011). Children who are candidates for cochlear implantation are followed by speech and hearing therapists and undergo speech evaluation for at least six months prior to the intervention. During this period, children are rehabilitated with hearing aids. If child don't have benefit from hearing aids, an implantation-specific preoperative processesare carried out. Only exceptions are made in a case of profound hearing loss caused by meningitis. These children are not amplificated for six months with hearing aids, but as soon as it is possible, they are implanted after the diagnostics. For four years after surgery and cochlear implant activation, children are involved in regular treatment, usually until the first year of school. This is the optimum amount of time for the development of a socially acceptable level of verbal communication (Nikolopoulos, Archbold, & O'Donoghue, 1999; Nikolopoulos, Dyar, Archbold & O'Donoghue, 2002; Nikolopoulos, Dyar, Archbold & O'Donoghue, 2004). In children with prelingual bilateral hearing loss, the optimal time for cochlear implantation is before the age of three, after which brain plasticity reduces significantly. Synaptogenic activity in the auditory cortex, audio information convergence and the creation of acoustic engrams – all essential for understanding speech – significantly decrease with age (Spencer, 2004; Visher, Kompris, Seifer & Hauser, 2004; Clark, 2003). If children receive implants at an early age – i.e. during the first two to three years of life – it is expected that they will achieve the same level of speech development as children with medium-level hearing loss (approximately 40-60 dB) (Fitzpatrick, Crawford, Ni & Durieux- Smith, 2011; Erber, 2011).

Early diagnosis, rehabilitation and amplification with hearing aids and cochlear implants aim to reduce the negative effects of hearing loss in childhood and to improve perception, production and speech and language development in children with hearing impairment. Perception, production factors and language development factors influence the use of syntax in children with hearing impairment (Friedmann & Szterman, 2006; Guo, Spencer & Tomblin, 2013). Speech and language development in children with cochlear implant at both pre-school and early primary schoolchildren involves the use of compound and complex sentences, the understanding of both receptive and expressive language, and comprehension of the normal school curriculum (Nicholas & Geers, 2007; Punch & Hyde, 2005).

Language develops in response to biological and environmental conditions, within a fairly universal time frame for all humans (Smith, 2006). Most of the studies show that children with hearing impairment progress in the usual order of language development, but slower than children with normal hearing. Differences in the syntactic abilities of children with hearing impairments compared to children with normal hearing are noted in both the production and the understanding of the language (Pisoni, Kronenberger, Roman & Geers, 2011; Tur-Kaspa & Dromi, 2011). Sentences in children with hearing impairment are ungrammatical. They incorrectly use grammar rules (in use of singular and plural, gender, auxiliary verbs, etc.). They also have trouble in using complex syntactic structures (Friedmann & Szterman, 2011; Guo, Spencer & Tomblin, 2013).

Most of the authors agree that speech and language development in children with cochlear implants depends on the age at which hearing loss occurred, the children's age and remaining hearing ability before the intervention, and the duration of the rehabilitation period (Geers, 2002; Geers, Nicholas & Sedey, 2003; Niparko et al., 2010). Fitzpatrick et al., (2011) observed 88 children aged 4 to 5. The sample consisted of 26 children with cochlear implants and 25 children who used a hearing aid. The degree of hearing impairment ranged from moderate to profound. The remaining 37 children had normal hearing. All children with hearing impairment were included in a rehabilitation program that focused on the development of oral language. Concerning the development of oral skills, there was no significant difference between children with hearing aids and children with cochlear implants. The speech and language development of children with hearing impairment was delayed compared to children with normal hearing. The results of this study showed that successful speech and language development was influenced by the degree of hearing loss in the children and by the education of parents. In this study the age at which hearing impairment was diagnosed did not affect the development of language skills. In contrast, Svirsky et al., (1999) found that implantation at an early age mitigated the consequences and the delay in language development. Many other studies have found that the age at which implantation takes place does influence the use of syntax of children with cochlear implants. Nikolopoulos et al., (2004) concluded that children with cochlear implants have difficulties with the acquisition of syntax and morphological patterns, but that their results improve with time. Niparko et al. (2010) also found that the age of implantation, along with the level of residual hearing, higher socio-economic status and better parent-child interaction lead to better language development.

Inscoe et al., (2009) found that children with cochlear implants have expressive spoken language abilities behind those of their normally hearing peers. Their development of syntax and sentence structures was delayed in comparison to children with normal hearing. Spencer et al., (2003) examined the relationship between language and literacy in children with cochlear implants. Their written works were simpler, in syntactical sense, than that of children with normal hearing, but there was no significant difference concerning the number of words per clause. Significant differences were found in the ability of the children with cochlear implant to correctly utilize grammatical structures such as conjunctions and correct verb forms when they were required to formulate written and oral sentences.

Friedmann and Szterman (2006) researched the comprehension and sentence production of children with hearing impairments and different modalities of auditory amplification. They found that the degree of hearing impairment, duration of use of cochlear implant and the modality of hearing amplification did not influence syntactic comprehension, but the age of intervention was important. Only children in the study who received hearing aids before the age of 8 months were successful in understanding and carrying out tasks related to relative clauses and sentence with syntactic movements. Friedmann and Szterman (2011) confirmed that the understanding of question forms and other syntactic structures is influenced by the age of amplification and the oral rehabilitation approach. They believe that the difficulties in forming syntax appear due to the introduction of amplification via hearing aid or cochlear implant after two years of age. Based on these researches, it is clear that it is very important to respect the critical period for language development, and to provide adequate amplification in that period (Kuhl, Conboy, Padden, Tobey & Pruitt, 2005). However, Duchesne et al., (2009) followed language and syntax development in children who were given cochlear implants between the ages of one and two years. Half of the participants displayed language levels as their peers with normal hearing, but only at the word level. Duchesne et al., (2009) found that the age at implantation within that period did not significantly affect language development, and six years after the implantation the children studied did not reached the level of their peers with normal hearing.

The mode of communication influences the development of language and communication skills in children with hearing impairment (Holt & Dowell, 2011; Sarant, Holt, Dowell, Rickards & Blamey, 2009). Children with hearing impairment who were in the listening and spoken language program tended to demonstrate better speech and language outcomes than those who were in the total communication (Geers, 2002; Geers, Brenner & Davidson, 2003).

The current study

The aim of the present study was to advance the observation and tracking of the development of sentence structure among children with cochlear implants, since the pace of linguistic development can vary from child to child. We explored and compared sentence performance among children with hearing impairment who had cochlear implants or hearing aids (the experimental groups) and children with normal hearing (the control group) – an approach suggested by Edwards et al., (2010). The research questions guiding the research were:

- How does the length of amplification influence the development of syntactic structures in children with cochlear implants?
- How does the length of rehabilitation treatment influence the development of syntactic structures in children with cochlear implants?

METHODS

Participants

This study included 75 participants. The sample included three groups: 25 children with cochlear implants; 25 children with hearing aids; and 25 hearing children, representing the control group. The group of children with cochlear implants consisted of 12 boys and 13 girls, aged from 4 to 8. The group of children with hearing aids consisted of 13 boys and 12 girls, aged for 5 to 8. The group of children with no hearing impairment consisted of 15 boys and 10 girls, aged from 4 to 8, as seen in table 1. The exclusion criterion for all groups was the presence of other neurological or developmental disabilities and/or socio-emotional behavior problems. The participants with cochlear implants were children with a profound hearing loss that occurred before the child's second year, in prelingual period, above 85 dB nHL in the better hearing ear prior to implantation. All the children with cochlear implants were unilaterally implanted, on

ENT Clinic of Clinical Center of Vojvodina. The inclusion criterion for this group was that implantation took place before the age of 5. The participants with conventional hearing aids were children with moderate to severe hearing loss in the better hearing ear (45-75 dB nHL). All the children with hearing loss underwent speech and hearing treatment. All children with hearing impairment had IQ in normal ranges. The control group consisted of children with typical language development, normal ranges of IQ and no hearing impairment.

Procedure

All study procedures were reviewed and approved by the Ethics Committee of the Clinical Centre of Vojvodina. The parents of children who participated in the research signed written informed consents. The children with hearing impairments were patients at the ENT Clinic in the Clinical Centre of Vojvodina. Children with no hearing impairments were recruited from primary schools in Novi Sad.

Measures

Syntactic performance. Syntactic performance was estimated using a battery of speech and language tests: "Linguistic Evaluation of Individual Components of Dysphasic Syntax" (Blagojević, 1983) and the use of simple, compound and complex sentences was examined in all three groups. The use of simple, compound and complex sentences was evaluated by the first subtest. This subtest consisted of five pairs of content-related images (picture stories). The test was used to evaluate the child's ability to describe images, to note and connect elements found in images, and to accurately express themselves verbally. The test was used to analyze children's sentences, following other authors (Erber, 2011; Vischer, Kompris, Seifer & Hauser, 2004; Wolbers, Dostal & Bowers, 2012; Nicholas & Geers, 2007). Analyze was related to the use of simple sentences, compound sentences, compound sentences with "but" and "or", and complex sentences when describing shown images.

Data about the demographic and clinical characteristics of the sample and the socio-economic characteristics of families were collected by specific questionnaire and from medical documentation. As in common in this domain, the children with hearing impairment were divided and monitored by amplification modality, age of diagnosis, degree and etiology of hearing loss, age at the beginning of rehabilitation, duration of use of cochlear implant or hearing aid, as well as the duration of the rehabilitation period (Geers et al., 2002, 2003; Guo et al., 2013; Most & Aviner, 2009). Socio- demographic details about parents included age, education and employment of parents.

Data Analyses

All statistical analyses were done in SPSS for Windows 10.0. Descriptive statistics were calculated to analyze the samples and their characteristics. Comparisons between groups were done by Pearson's c2 tests and t- tests. Fisher's Exact Test was used to examine differences in frequencies. Multiple regression analysis was considered to determine what variable/s most account for variance in production of sentences. Probabilities below 0.05 were considered significant. A linear time trend was use to present fluctuations of sentences use over time, regarding the hearing age and the duration of rehabilitation period.

RESULTS

Demographic and clinical characteristics are showed in table 1. There was no statistical difference between the groups regarding gender, age at testing, Apgar score at birth, or duration of intervention (table 1).

One of the variables taken into consideration in this study was the duration of time over which rehabilitation occurred, as well as its impact on the speech development of the children. Both groups of children with hearing loss underwent equal periods of rehabilitation. The average duration of rehabilitation was 45 SD 13.47 months in children with cochlear implants, and 38 SD 17.05 months in children with hearing aids. No statistically significant difference was detected between the length of the rehabilitation period in children with cochlear implant and children with hearing aids ($t=1.262$, $p > 0.05$).

The second variable examined in this study was the duration of the use of cochlear implants and hearing aids. The average length of use of cochlear implants was 37 month. Children with cochlear implants used hearing aids for at least six months prior to implantation. The average use of hearing aids before implantation in the first study group was 13 SD 10.75 months, while in the second study group, the average length of hearing aid use was 35 SD 13.42 months.

Table 1 *Demographics and clinical characteristics of sample*

	Children with CH (N=25)	Children with HA (N=25)	Children without HI (N=25)	Level of significance
Gender (n) male female	12 (48%) 13 (52%)	13 (52%) 12 (48%)	15 (60%) 10 (40%)	NS
Child age at testing (months) Main (SD) min-max	78 (SD 13.62) 52- 96	80 (SD 15.02) 60-95	78 (SD 15.36) 50-80	NS
Apgar score Main (SD) in 1. minute Main (SD) in 5. minute	8.48 (SD 1.94) 9.24 (SD 1.05)	8.80 (SD 1.56) 9.40 (SD 0.91)	9.28 (SD 0.79) 9.68 (SD 0.55)	NS
Age of mother at time of childbirth (years) Main (SD) min-max	28+ (SD 4.46) 19- 36	27.0 (SD 3.52) 20- 34	28+ (SD 3.43) 22- 35	NS
Age of diagnosis (months) Main (SD) min-max	21 (SD 6.89) 9- 36	37 (SD 9.72) 17- 55	NA	***

Degree of hearing loss (dB) Main(SD) min-max	96.4 (SD 4.99) 85- 105	61.46 (SD 8.91) 45-75	NA	***
Etiology of hearing loss (n) Unknown Meningitis Preterm babies Complication in birth Genetic	10 (40%) 8 (32%) 1 (4%) 4 (16%) 2 (8%)	11 (44%) 0 (0%) 1 (4%) 3 (12%) 10 (40%)	NA	**
Age at the beginning of intervention (months) M (SD) min-max	32 (SD 10.78) 18- 48	42 (SD 12.49) 17- 78	NA	**
Duration of intervention (months) Main (SD) min-max	45 (SD 13.47) 18- 63	38 (SD 17.05) 17- 66	NA	NS
Age of implantation (months) Main (SD) min-max	42 (SD 11.98) 20- 58	NA	NA	NA
Duration of use of hearing aids (months) Main (SD) min-max	13 (SD 10.74) 0- 36	35 (SD 13.42) 7- 55	NA	***
Duration of use of implant (months) Main (SD) min-max	37 (SD 12.62) 6- 60	NA	NA	NA

Notes: Cochlear implant- CH; hearing aids- HA; hearing impairment- HI; NS- not significant; NA- not applicable; * $p < 0.05$; **$p < 0.01$; ***$p < 0.001$.

There were no statistical differences between the groups in regard to the socio-economical characteristics of parents, as seen in table 2.

Table 2 *Socio-economical characteristics of parents*

		Children with CH (N=25)	Children with HA (N=25)	Children without HI (N=25)
Age of parents at time of testing in years	Father (years) Main (SD) min- max	38+ (SD 6.91) 27- 55	37.0 (SD 4.22) 29- 47	38+ (SD 3.65) 33- 47
	Mother (years) Main (SD) min- max	35+ (SD 4.33) 27- 42	33+ (SD 3.84) 25- 42	34+ (SD 3.63) 26- 41
Education of parents in years	Father (n, %) 8 y 12 y ≥16 y	2 (8%) 19 (76%) 4 (16%)	3 (12%) 20 (80%) 2 (8%)	0 (0%) 19 (76%) 6 (24%)
	Mother (n, %) 8 y 12 y ≥16 y	3 (12%) 19 (76%) 3 (12%)	2 (8%) 17 (68%) 6 (24%)	3 (12%) 13 (52%) 9 (36%)
Employment of parents	Father (n, %) yes no	24 (96%) 1 (4%)	25 (100%) 0 (0%)	24 (96%) 1 (4%)
	Mother (n, %) yes no	13 (52%) 12 (48%)	19 (76%) 6 (24%)	19 (76%) 6 (24%)

Note: Cochlear implant- CH; hearing aids- HA; hearing impairment- HI.

Syntactic performance

The main objective of this research was to examine the syntactic constructions used by children with cochlear implants and children with hearing aids. The results were divided into two groups. The first compared the results of the study groups in regard to the use of simple sentences, and the second compared the study groups' use of compound, compound sentences with "but" and "or", and complex sentences. Children with cochlear implants showed a positive linear time trend in the use of sentences in relation to hearing age and duration of rehabilitation.

The use of simple sentences

Most of children with cochlear implants, 20 (80%), used simple sentences when describing images, whereas the so-called infantile sentence (a single word used instead of a sentence) was used by 3 (12%) of these children. Use of gestures was found in 2 (8%) of these children. When describing images, children with hearing aids used simple sentences in 24 (96%) cases, while children with no hearing impairment used simple sentences in 16 (64%), because they used more complex sentences. In group of children with hearing aids, 9 (4%) of them used infantile sentences (figure 1). Analysis of the use of simple sentence in children with cochlear implants and children with hearing aids revealed statistically significant differences (c2 test, c2= 4.167; p=0.041).

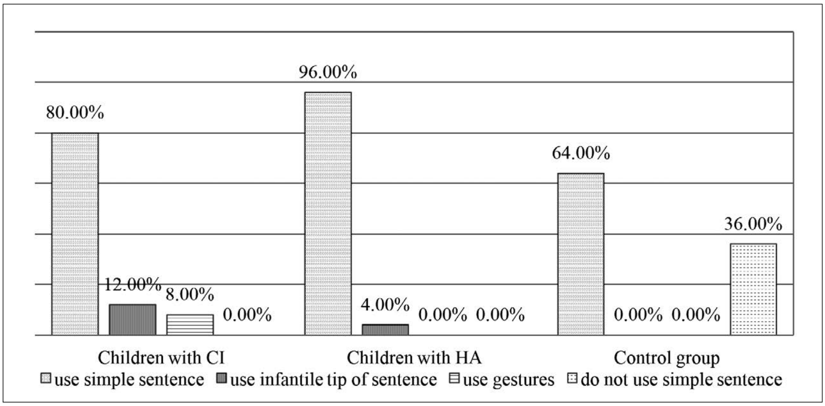

Figure 1 The use of simple sentence in the test of syntactic performance

The use of compound sentences

Figure 2 shows the use of compound sentences, compound sentences with "but" and "or", and complex sentences by children with hearing impairment with different modalities of sound amplification compared to children with normal hearing. The results show that 10 (40%) children with cochlear implants used compound sentences when describing images, whereas children with hearing aids and children with normal hearing used them in 20 (80%) cases (Fisher test, p < 0.01).

Children with cochlear implants used compound sentences with "but" and "or" when describing images in 6 (24%) cases, children with hearing aids used them in 16 (64%) cases, and children with no hearing impairment used them in 14 (56%) cases (figure 2).

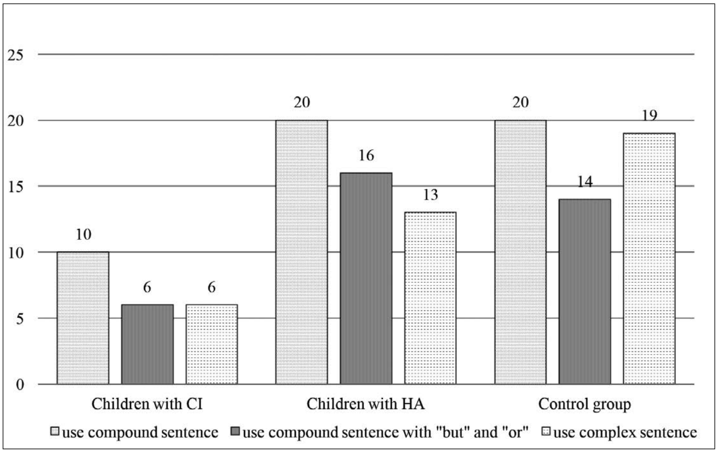

Figure 2 The use of compound and complex sentences in the test of syntactic performance

Statistically significant differences were identified between children with cochlear implants and the two groups in regard to the use of compound sentences with "but" and "or" (Fisher test, $p < 0.01$).

The use of complex sentences

Figure 2 also shows the use of complex sentences by children with cochlear implants, children with hearing aids, and children with no hearing impairment. Children with cochlear implants used complex sentences when describing images in 6 (24%) cases; 13 (52%) children with hearing aids, and 19 (76%) children with no hearing impairment used them when describe shown images. Children with hearing aids and children with no hearing impairment used complex sentences more often than children with cochlear implants did (c2 test, c2= 13.549; p=0.001).

Linear time trends in appearing of sentences types in children with cochlear implants

Linear time trends in appearing of sentences types were studied in regard to the duration of period for which cochlear implant had been used- hearing age, and duration of intervention.

Linear time trends in the appearance of simple, compound and complex sentences in relation to the hearing age of children with cochlear implants are shown in figure 3.

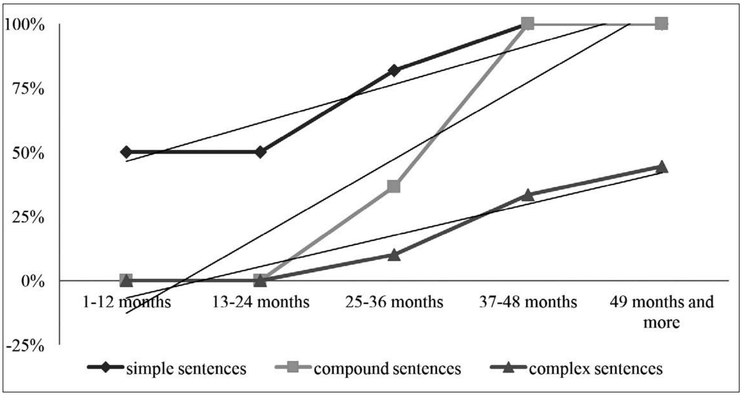

Figure 3 The appearance of sentences in children with cochlear implants, depending on the length of using cochlear implant

The data show a positive relationship between the uses of simple sentences by children with cochlear implants in relation to their hearing age. The use of simple sentences began before the twelfth month of implant use, and by this time, 50% of implanted children were using simple sentences. An improvement was noted after the twenty-fifth month of cochlear implant activation. By the fourth year of cochlear implant use, 100% of the children had used simple sentences.

The use of compound sentences first occurred twenty-four months after cochlear implantation. Progress was observed between the twenty-fifth and the forty-eighth month of cochlear implant use. It is expected that 100% of children with cochlear implants with a 4 year hearing age will have started to use compound sentences (figure 3).

The use of complex sentences first occurred between 25 and 36 months after cochlear implantation. After children had used cochlear implants for 49 months or more, 30% used complex sentences. There was a positive linear progressive improvement in the use of complex sentences (figure 3).

A multiple regression analysis was performed to check the effect of covariates on significant differences between groups, shown in table 1. Results show that age at the beginning of intervention (F=8.614; $p < 0.001$) and duration of rehabilitation (F=4.516; p=0.008) had influence on the appearance of sentences, but degree of hearing loss did not (F=0.56; p=0.644).

The appearance of sentences in relation to the duration of the rehabilitation period for children with cochlear implants

Figure 4 shows the appearance of simple, compound and complex sentences by children with cochlear implants in relation to the duration of the rehabilitation period. The use of simple sentences was first noted after 13 months of rehabilitation, while intensive progress occurred between the 25th and the 36th month of rehabilitation. After 4 years of rehabilitation, the use of simple sentences was evident in 100% of the children with cochlear implants (figure 4).

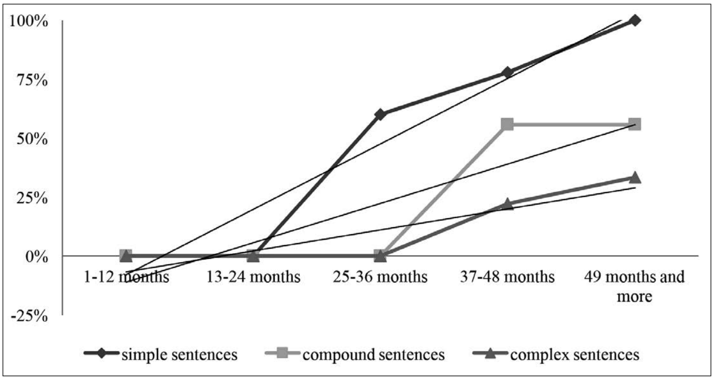

Figure 4 The appearance of sentences in children with cochlear implants, depending on length of rehabilitation

Compound sentences appeared after 36 months of rehabilitation. A sharp increase in their use occurred by the 48th month, when it reached a plateau. After 49 months of rehabilitation, compound sentences were used by 60% of children with cochlear implants.

Figure 4 shows the positive linear trend in the use of complex sentences among children with cochlear implants in regard to the duration of the rehabilitation period. Complex sentences appeared after 36 months of rehabilitation and usage increased until the 48th month. After 49 months of rehabilitation, complex sentences were used by around 30% of the children with cochlear implants.

DISCUSSION

The present paper studies development the syntactic performance of Serbian-speaking children with cochlear implant in comparison with children with hearing aids and age - matched peers with normal hearing. Syntactic performance was assessed through the complexity of sentences that children used when describing pictures. Main factors that were taken into consideration were hearing age and the duration of rehabilitation period.

Hearing age is the duration of period that the child has been receiving auditory input through a cochlear implant. The duration of the rehabilitation period refers to the time spent in therapy before and after cochlear implantation, regardless of the type of hearing aid, while chronological age is the child's actual age. All these factors affect speech-language development in children with cochlear implants, with varying degrees of significance. Many studies show that cochlear implants affect the development of both the receptive and expressive language skills (Blamey et al., 2001; Clark, 2003; Duchesne et al., 2009; Geers et al., 2003; Nikolopoulos et al., 1999; Nicholas & Geers, 2009; Slavnić & Vujanović, 2004). The present study examined expressive speech-language development in relation to syntactic structure.

Significant differences in age of diagnosis, age at the beginning of intervention and duration of use of hearing aid were found between the group of children with cochlear implants and the children with hearing aids. The reason for this lay in the difference in the degree of hearing loss in the children in the study. Children with moderate to severe degrees of hearing loss tend to be detected later than in development country, due to lack of universal neonatal screening of hearing in Serbia. Also, children with profound hearing loss are detected earlier than children with moderate hearing loss, because parents suspect that there is a hearing impairment, as they don't react on sound stimuli. Parents of children with moderate hearing loss suspect later on impairment, only when spoken production of child does not go according to age.

The sentence is the largest unit of syntax (Dimić, Dinić & Isaković, 2012). The first children's words have a meaning of sentence. They appear between 12th and 18th months of life. In next period, between 18th and 24th months, sentences usually have two to four words. They can be declarative, interrogative, imperative and exclamatory, by function. Until the end of third year, sentences are made of four to five words. Also in that period, in Serbian- speaking children, the compound sentences appear, mostly with coordinating conjunction "*and*". Sentences still can have ungrammatical elements. It is expected that grammatical errors disappear during fourth year. Linguistic competences significantly extend in preschool (5-6 year old) and early school ages (Kašić, 2002). The complex sentences, with dependent clauses, are expected in early school ages. They improve the cohesiveness of narratives and increase the sophistication of written language (Paul, 2001).

The present study showed that after 18 months rehabilitation and amplification, the children with cochlear implants vocalized the subject – e.g. "*boy*" – but gesticulated the predicate – e.g. "*eats*". Concerning syntactic constructions, children with cochlear implants first used subject phrases with the conjunction "*and*", but used them as ungrammatical sentence with no plural marker. As sentence structure developed further, compound sentences with the coordinating cumulative conjunction "*and*" appeared without adequate pronoun, or without an object, as the object was gesticulate. Complex sentences were the last to develop, as in "*Girl dresses to go to school*". The grammaticality of these sentences improved after a longer period of rehabilitation and amplification.

Children with cochlear implants did not use simple three-word sentences with a subject, a predicate and an object, while one child with hearing aids had an infantile sentence form in which the object or predicate was omitted. Friedmann and Szterman (2006) found that in children with hearing impairment, ungrammaticality stems from improper usage or omission of the object. Friedmann and Novogrodsky (2007) confirmed these claims in further research. They found that hearing impairment contributes to difficulties in forming sentences.

The results of our study showed that children with hearing aids mostly use simple sentences (96%), similar to the children with cochlear implants (80%), while 64% of normal hearing children use simple sentences. Children with normal hearing had a higher level of language development, using both compound and complex sentences in their statements. These results are in line with other studies (Friedmann & Novogrodsky, 2007; Grodzinsky, 1989; Grodzinsky, 1995). Children with cochlear implants showed specific speech patterns. In our study, 12% of the children used a single word subject while the predicate was indicated through gesture, and 8% of them used gesture with no verbal output at all. These results are consistent with those of other studies on speech and language development in children with hearing impairment (Dillon, Jong & Pisoni, 2012; Guo et al., 2013; Wolbers, Dostal & Bowers, 2012). The one-word stage of language development occurs at the age of twelve months in normal hearing children. At this stage the single word stands in place of a full sentence(Saffran & Schwartz, 1994). Luria (2000) associates the onset of the child's first words with the age of 12 to 18 or 20 months. The first words are amorphous and polysemous – one word has multiple meanings. They are always associated with an action, a communicative context, gesture or intonation. It has also been established that the first simple sentences occur very quickly after cochlear implantation, provided that implantation is performed before the second year of age, but most if not all children with cochlear implants need about 5 years to start using complex sentences regularly in their statements. These results are in line with study conducted by Guo et al., (2013). In our study, the first simple sentences in children with cochlear implants occurred 13 months after the beginning of rehabilitation, but optimal results are achieved after 4 years of rehabilitation.

In our study, children with cochlear implants used compound sentences half as much as children with hearing aids and children with normal hearing. Compound sentences with "but" and "or" were not used by the majority of the children with cochlear implants. Children with hearing aids used compound sentences with "but" and "or" more often, which led them to achieve results in line with their peers with normal hearing.

The use of complex sentences among children with hearing impairment depends on the age and hearing experience of the child, residual hearing, and the level and duration of rehabilitation (Friedmann & Szterman, 2006; Friedmann, Novogrodsky, 2007). It is necessary to understand how complex sentences are acquired in children with normal hearing in order to be able to map language development in those with hearing impairments. The order of acquisition of complex sentences among eight- year-old children with normal hearing is as follows: nominal, adverbial of result, relative, adverbial of purpose, adverbial of manner, adverbial of time and adverbial of concession. The production of complex sentences depends on the acquisition of sentence elements – i.e. subject, adjective, object, and adverbials. The sentence elements are acquired at an earlier age (Friedmann & Szterman, 2006). The emergence of pragmatics has a positive influence on the development of communication, the acquisition of sentence elements, and thereby sentences among children with hearing impairment (Paatsch & Toe, 2014; Most, Shina-August & Meilijson, 2010).

In our study, complex sentences were more used by children with normal hearing then children with a moderate to severe degree of hearing loss amplified with hearing aids. The poorest results were obtained in children with cochlear implants, who had profound hearing loss, which suggests that the degree of hearing impairment influenced the development of syntactic structures, and limits all levels of language development (phonological, linguistic, semantic and morphological). These results are consistent with studies conducted in Serbia and elsewhere (Nikolopoulos, 1999, 2002, 2004; Sokolovac, 2010; Spencer, 2004). Fitzpatrick et al., (2012) found that children with moderately severe or severe hearing loss can develop spoken language skills that are within the range expected for normal hearing children.

Sentence complexity is related to vocabulary richness, as well as skills in using terms and concepts (Vygotsky, 1996). Children with hearing impairment, especially children with profound hearing loss, have poorer vocabulary and a less developed capacity to manipulate terms and concepts. As a result, they find it easier to use simple sentences than other sentence structures (Sokolovac, 2010; Sokolovac, Slavnić, Komazec & Lemaić-Komazec, 2011). Our results indicate that of children with cochlear implants are mainly focused on concrete situations and object, with lead them to mostly use simple sentences. These utterances have only one constituent and are often incomplete sentences. In contrast, normal-hearing children's attention is directed to the situation and additional information about the place, manner, cause and realization of the situation. Because of that, they more often use complex sentences (Paatsch & Toe, 2014; Remmel & Peters, 2009; Sokolovac, 2010). While examining the course of language development, Brown (1997) found that statements pointing to objects and phenomena were dominant at the lower level of its first stage of language development. Our research and many others show that children with hearing impairments are at a lower level of language development compared to their normal-hearing peers (Akamatsu & Musselman, 1999; Goldin-Meadow, 2003; Huttunen, Rimmanen, Vikman, Virokannas, Sorri et al. 2009).

The current study has several limitations. The groups of children with hearing impairment were differed with regard to the age at diagnosis, age of the beginning of intervention and the age at which useful hearing aid was received. We explained the reasons for this above, but we are aware that that can by main limitations of our study. Sentence production in this paper was assessed in test situation. A wider picture of syntactic performance could be obtained through the study of spontaneous speech. Although both groups of children with hearing impairment undergo rehabilitation based on the listening and spoken language, the educational setting can influence the language development. We have not taken into account educational setting, because most of the children changed it, in accordance with their and parents' needs and preferences. The results from this study can only be generalized to children with similar characteristics, involved in similar type of services and practices to managing hearing impairment.

CONCLUSION

Children with cochlear implants showed positive progress in acquiring the language. Our research suggests that children with cochlear implants did not show a significant improvement in the syntactic performance during the first year of hearing age and rehabilitation. They vocalized the subject, commonly a noun, while the predicate is a gesture. Simple sentences appeared during the first and second year of hearing age, and compound sentences appeared during the third year. Regarding to duration of rehabilitation, simple sentences appeared during the third year. Compound and complex sentences emerged during the fourth year of rehabilitation. Children with cochlear implants reached maximum language subsystem maturity during the fourth and fifth year of hearing age and rehabilitation. Important factors that influence the syntactic performance are hearing age, duration of rehabilitation and degree of hearing impairment.

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CHALLENGES FOR EARLY RECOGNITION OF CHILDREN WITH ASPERGER SYNDROME

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SUMMARY

Asperger syndrome (AS) was first introduced in the Diagnostic and Statistical Manual of Mental Disorders (DSM-IV) as a unique diagnostic category separate from autism, only to be jointly incorporated with autism into the category of Autistic spectrum disorders in the latest revision of the Manual (DSM-5). The existence of significant differences to autism complicates the recognition of this syndrome, and its early treatment. AS is characterized by social-communicational deficits, limited and repetitive behavioral patterns and difficulties in motor activities. Although verbal and cognitive abilities can be good, the speech is often conspicuous for its unusual formulations and prosody, formal manner of speaking or misinterpretation of implicit meanings.

There is no specific test for AS. Since the affected children have diverse combinations of symptoms, early diagnostics is often difficult and the recognition of AS is prolonged. Case files from clinical practice further acknowledge the need for timely recognition of areas in which the child`s functioning is impaired, in order to provide him/her and the family the support they require. Cases are presented of children whose Asperger symptoms were recognized at different ages with a review of clinical characteristics included. Specific difficulties are identified in older children in the form of superimposed symptoms such as anxiety and depression.

AS often goes without proper early diagnosis or is misdiagnosed, preventing appropriate therapeutic interventions and support to be offered to the affected child and his/her parents. Delayed recognition of AS leads to difficulties in implementing early support programs.

Key words: Asperger syndrome, assessment, early identification

INTRODUCTION

A few other diagnostic categories in developmental psychopathology raise so much controversy as Asperger syndrome (AS). In the Diagnostic and Statistical Manual of Mental Disorders from 1994 (DSM-IV) (American Psychiatric Association, 1994), AS was formally assigned a separate diagnostic category despite many opposing opinions (Woodbury-Smith, Klin & Volkmar, 2005). In the latest edition of the manual (DSM-5) (American Psychiatric Association, 2013) autism and AS were united under the common label of Autistic spectrum disorders. Nevertheless, many clinicians continue to endorse the opinion that these are two separate entities, each with its own specific features which are revealed during clinical assessment. It is of critical importance not only to

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recognize a child exhibiting certain elements pointing to AS, but also to assist that child and his family in coping with the difficulties and deficits that he has.

Disagreements concerning the definition of a problem and its features sadly often lead to prolonged time needed to recognize a child`s condition a subsequently to inadequate support provided to that child. Thus a possibility of timely therapeutic efforts is also missing, including an early intervention with a child and the family system. On the other hand, the most successful intervention programs are those that start as early as possible. It has been shown that adopting behavioral strategies at an early age can minimize later behavioral problems common to persons with AS (Howlin, 1998).

Hence an attempt of early intervention in children with AS is clearly very delicate. The term early intervention usually implies an intervention in the first few years of a child`s life. This raises a very important issue of conditions that go unrecognized at an early age. One of these is commonly AS. Parents are usually the first to notice that a child is failing to fit into the social environment e.g. with peers in kindergarten or at the playground. However, a child`s attentiveness to specific things, usually involving a narrow field of interest, but with elaborate knowledge and detail can be misleading. Namely, parents often find their child to be precocious or "too smart" for his age, so that all the other children are far below his capacities and therefore uninteresting to him, which is why he is reluctant to play with them. Coming to a conclusion that other children are not the problem after all can take years. Having this in mind, it is clear why providing early intervention to children with AS has proven to be challenging. Studies show that the average age of diagnosing AS is eight years, or even much later (Aleksić-Hil, Garibović, Pejović-Milovančević & Popović-Deušić, 2009; Eisenmeier et al., 1996). Diagnostic classifications are intended to facilitate the recognition of symptoms, to direct assessment procedures and therapeutic interventions, enable an easy communication between professionals and familiarization of the parents with the problem. However, when certain conditions in child psychopathology are concerned, professionals as well as parents are reluctant to diagnose a child because the diagnosis is considered to label a child in a negative way, instead of enabling him/her to receive appropriate assistance and guidance in the form of therapeutic interventions and support.

Regardless of the controversy surrounding the diagnostics, as well as of the prolonged time period needed to recognize the problem a child might have, and not infrequently of the failure (by parents or teachers) to accept the fact that a child`s daily functioning is challenged, clinical practice points to certain difficulties that children with AS features experience. Whatever we choose to name these problems, whether we opt to regard them as variations within normal or common, or deviating from normal, we cannot and must not deny them the attention they deserve. The fact that there is a child with AS like features in almost every school cannot be overlooked (Atwood, 2010). Studies that monitored children diagnosed with AS over a time period have found that this disorder is stable over time and that its main features established in childhood remain present in adult age. AS is much more common in boys, the gender ratio being 8:1 (Popović-Deušić, 1999).

The purpose of this study is to understand children with AS features better, to recognize the difficulties they face and to point out the importance of early recognition of problem areas in order to provide the much needed support to children and their families.

Background

The name AS was first used by Lorna Wing in 1981. She used it for children with features similar to those described by the Viennese pediatrician Hans Asperger. Asperger in fact considered them to have a personality disorder which he labeled "autistic psychopathy" (Fitzgerald & Corvin, 2001). With this determination he attempted to underline the difficulties experienced by these persons in understanding emotional expressions of other people as well as the difficulties other people had in understanding them. He described children with poor social interactions, labored communication and development of specific interests corresponding to descriptions of autistic children independently provided by Leo Kanner almost at the same time. However, in contrast to children depicted by Kanner, Asperger`s children had better abilities. He initiated treatments for these children, including educational programs with speech therapy, drama therapy and physical rehabilitation.

Lorna Wing accentuated the fact that although some children had classical signs of autism, they managed to develop fluent speech and the desire an interaction with others. Nevertheless, they still have significant problems in the development of more complex social skills. Her findings allowed her to determine the main characteristics of children with AS: a lack of normal interest and pleasure in people around them; a reduction in the quality and quantity of babbling; a significant reduction in sharen interests; a significant reduction in the wish to communicate verbaly or non-verbally; a delay in speech acquisition and impoverishment of content; no imaginative play or imaginative play confined to one or two rigid patterns (Wing, 1981). Wing defined a "triad" of impairment including social, communicational and imaginative abilities. Her work was an inspiration for many later researchers, such as Gillberg (1991) who provided his own diagnostic criteria for AS: social impairments; narrow interests; repetitive routines; speech and language peculiarities; non-verbal communication problems; and motor clumsiness. The efforts of Lorna Wing gave a direction to discussions and deliberation on children with AS, through which this term became commonly applied to children with autism, who have high intelligence levels. It is, however, important to add that a clearer delineation of AS from autism would be beneficial for clinical practice in a way that it would allow the affected children to receive adequate professional assistance. It would be helpful to researchers, parents and people with AS themselves.

Basic characteristics

The main clinical features of children with AS include numerous problems in social interactions, difficulties communicating, and narrow, highly specific and intense interests in subjects such as statistical data. The assessment of AS is usually done based on the recognition of problems in three main areas, considered crucial for diagnosing autism as well, i.e. socialization, communication, and range of behavior. However, the two disorders have some very important differences that cause diagnostic controversy. All the main areas of problematic functioning in children with AS, will be covered in the following section of the paper.

Social behavior

The most prominent difficulties in children with AS are attributed to their social functioning. Children do not succeed in establishing a satisfying interaction with peers, but are well aware of other people and show interest in them (Volkmar & Klin, 2000). When they wish to fit in and have contacts with other children, they often don`t know how to do it. They behave unusually, do not understand rules of socially acceptable behavior, and show a lack of empathy, so they appear inadequate during a conversation. Their impairment of social skills can be reflected in speaking at length about a subject that is interesting to them, going into a number of details, even showing unexpectedly good knowledge of the subject considering their actual age, but being totally unaware that the other person does not share their interest in this matter. They seldom establish eye contact with other people as this appears to somehow disturb their concentration. Children with AS sometimes avoid social interactions not only for the lack of social skills, but also for the wish to be in total control of an activity (Attwood, 2010). Children are often uninterested in undertakings of other children, they go about their own activity which they choose not to explain to others, and they sometimes behave in an abrupt and obnoxious manner so that other children would leave them alone to carry on with their desired course of action. Sometimes they just want to be left alone and they seem quite pleased doing something other children would soon find monotonous and boring.

Parents of a boy in our psychotherapeutic treatment pointed out that he refused to go out and spend time socializing with other children during school recess, but insisted on staying in the classroom the whole time. Since the teachers were also reluctant to support this kind of behavior, we reached an agreement to have him go out during recess and structured this time period with a few simple activities that involved superficial contacts with other children as well. After a week, when he came to see his psychologist, he spoke excitedly about his spending time in the school yard during recess... The only activity that he turned out to be doing the whole time, was to observe some repair men change roof tiles and fix the school roof...

Younger children are not necessarily bothered by their peers not inviting them to birthday parties or social events. The older ones become more aware of their isolation, so they eventually develop a motivation to hang out with peers. However, at that point their poor social skills are even more noticeable, as well as their immature and rigid manner of playing and consequently they get even more rejected (Attwood, 2010). Sometimes children with AS appear to be unaware of the unwritten rules of social behavior so they inadvertently say or do something to offend other people. It is also common that after a child has been given explanations on certain rules of conduct; he/she applies them very rigidly and consistently, not willing to back away from them even when they are allowed to.

By the end of a swimming training session children were disobedient, they were splashing water and would not listen to their trainer`s instructions, so the trainer told them joking, as the training practice was coming to an end, that they would only be allowed to leave after they had swum across the pool for 10 more times. Children were laughing and started leaving the pool. The boy with AS continued swimming and, although he was exhausted, did not respond to other children calling him to get out of the pool because he wanted to complete what he felt was the trainer`s orders which needed to be respected.

Although it has been emphasized that children with AS lack empathy, it would be wrong to presume that they do not care about other people. Frequently, they can be perplexed by other people`s emotions or have difficulties in conveying their own. Their emotional expressions can be unusual, and they often miss subtlety and precision. Facial expressions can be limited or inappropriate with a specific of fixed glare. Sometimes the body language seems awkward, with limited use of gestures (Capps, Yirmiya & Sigman, 1992).

Communication

Research shows that almost half of the children with AS experience delayed development of language skills, although they generally speak fluently at the age of five (Eisenmajer et al., 1996). Regardless of their acquiring pronunciation and grammar in a way similar to other children, they appear odd in communication since they are unable to lead a normal conversation, i.e. use language in the social context (Klin, 2003). Children can initiate interaction with an unusual or conspicuous remark or question, or even break some of the common social rules. After they had started a conversation with someone, they would not stop talking until they had said all they wanted, completely unaware of the impression they leave on the other person and of the interlocutor`s total lack of interest in the subject. Even if the other person tried to change the subject, these children would not accept it and would always go back to whatever topic they were currently focused on. Children also occasionally give irrelevant comments unrelated to the subject, making a conversation awkward (Attwood, 2010). Despite the fact that a child`s monologue could seem serious, a listener would often be puzzled as to the actual bottom line of the subject and find it quite difficult to draw any conclusions on what a person with AS was talking about. If they tried to inquire on the subject, they would not understand it`s content or the logic in what the child was saying, while an attempt to shift the focus of conversation to some other, similar subjects would usually be fruitless (Klin, Volkmar, Sparrow, Cicchetti & Rourke, 1995). Other communicational difficulties of children with AS derive from the inability to understand hidden and implicit meanings and failing to understand that a single word can have multiple meanings.

Children were having fun by telling each other whom they or the members of their family resembled. They made comparisons to animals or objects. There was a point when a boy told another boy that his father looked like a hammer. Everyone took it as a joke and laughed. At that moment a boy with AS started explaining that fathers cannot be hammers, and kept insisting for the rest of the day that all children agree with him that a human being cannot resemble a hammer. He was very persistent and wouldn`t give up even after several school classes...

Another noticeable speech feature of children with AS is impaired prosody, i.e. unusual voice pitch, accent and rhythm. The speech lacks modulation in tone, accentuation, rhythm and melody (Klin, 2003). It can be monotonous or flat, or else with excessively precise diction accentuating each syllable. Persons with AS can speak too loud or too fast, thus compromising the accuracy of speech (Šimleša & Ljubešić, 2009). In somewhat older children, or adolescents with AS, speech can become meticulous or excessively formal, with a choice of words corresponding rather to an adult than a child (Attwood, 2010).

Interests

It has been shown that a propensity towards fascination with special interests that dominate time and conversational topics, as well as insisting on routines that need to be done, stay relatively stable over time (Klin, 2003). A child can collect particular objects irrespective of the current popularity of certain items among other children (e.g. stickers, marbles). The themes that occupy the attention of children with AS are not necessarily those popular among peers, or even if other children are indeed interested in them, their level of interest is far below that of children with AS. They accumulate wide, encyclopedic knowledge on certain subjects, read detailed data on their favourite theme and ask questions incessantly. Common topics include means of transport, the universe, and science. They seem to be very enthusiastic about statistics and order.

The difference between a normal range of special interests (hobbies) and interests related to accumulating objects or information that are seen in persons with AS lies in the fact that the latter tend to dominate time and conversation and that they are usually solitary. They need to be differentiated from the obsessive-compulsive disorder since people with AS appear to be genuinely enjoying being involved in their field of interest without attempting to resist it. By keeping to their routines, children with AS can significantly compromise the family`s quality of life. Parents usually support this since failing to adhere to routine behaviors (e.g. arrange all toys in a specific way before going to sleep) can induce tension and anxiety in the child. The problem is that rituals tend to extend over time and take increasingly longer to accomplish (Attwood, 2010).

Motor skills

Disturbances of motor skills are often associated with AS. Children with AS, regardless of the physical activities they engage in, are clumsier than their peers and this continues into adulthood. They also tend to be poorly coordinated. Their general clumsiness can be associated with problems related to poor motor planning and disturbed fine motor coordination. Children with AS are inept in ball games, they have an unusual gait and run awkwardly. They find it difficult to learn how to ride a bicycle; their skills in climbing up a slide are lacking. When they start school, their clumsiness is most noticeable in physical education classes. The insufficient development of fine motor coordination causes difficulties in tying of shoelaces, working with scissors and it is also manifested through poor handwriting. Motor clumsiness has a negative impact on the child`s participation in social activities, such as team games (Freitag, Kleser, Schneider & von Gontard, 2007; Jansiewicz et al., 2006; Rodger & Brandenburg, 2009). Problems have also been recognized in the domain of organizational praxia as well as in maintaining balance while keeping their eyes closed (Weimer, Schatz, Lincoln, Ballantyne & Trauner, 2001).

Many children with AS display a misbalanced motor development, but there are no universal and specific motor disturbances attached to AS. Significant difficulties have been noted in generalizing newly acquired skills to a wider context, or in applying motor skills in functional tasks. This information is also relevant from the interventional point of view, where opportunity needs to be given to practice motor activities and skills in varying contexts (Baranek, 2002). The importance of this lies in the fact that motor clumsiness can in the long run have a negative impact on academic achievement and job training of persons with AS (Myles, Cook, Miller, Rinner & Robbins, 2000).

Cognitive abilities

A likely cause of belated recognition of AS is found in the lack of significant deviation from normal intellectual abilities; in fact they are generally either average or above average. Neuropsychological examinations emphasize the existence of a specific profile of intellectual abilities in children with AS. On tests assessing intellectual abilities, they can be rather successful in general knowledge, arithmetic and block design subtests, while they perform below average on subtests that assess understanding and interpretation of social situations. The results on IQ tests are significant for detecting areas in which a child`s achievement is superior or inferior respectively. Since the combined profile of abilities obtained on intelligence tests is relatively disharmonious, one needs to be extremely cautious when using a single IQ measure to represent a child`s intellectual abilities (Attwood, 2010). Some children can experience problems with the flexibility of thinking, making it rigid and non-adjusting to change or failure (Minshow, Goldstein, Muenz & Poyton, 1992).

Some researchers also feel that AS should be considered to be a variation in cognitive style rather than a disorder. They corroborate their opinion with a discussion on the so-called central coherence. The term is used to depict a cognitive style as a continuum; with persons using a global perspective and focusing on the gestalt are placed at the one end, while people extremely focused on detail, losing a global interpretation of a situation tend to be at other end. According to this concept, persons with AS would have a very low central coherence, which would explain their preoccupation with detail. Children are focused on details of a picture or a story and are unable to connect them and experience as a whole (Shah & Frith, 2006). The lack of central coherence can be observed in the play of an infant who for example plays only with the wheels of a car, rather than with the whole vehicle. While in the realm of social relations there is not much use for an excessive interest in details, this can be rather important in certain other areas, such as informatics.

It is also emphasized that children with AS are delayed in the development of the theory of mind that represents the ability to understand other people`s beliefs and intentions and to predict their behavior accordingly (Baron-Cohen, 2001). Therefore children can often be puzzled by certain behaviors or reactions of other people, finding their behavior to be unpredictable. Children can also fail to inform anyone or explain an important situation that has happened to them (e.g. being intentionally hurt by someone) because they think that a parent or a teacher already knows about it.

Cases of children with AS characteristics

Cases are demonstrated of children in which AS features were observed during a psychological evaluation, and obtained through anamnestic data provided by parents. Children`s age varies. Although all children display features pointing to AS, only one child (the oldest) is actually diagnosed with AS. Due to the controversy surrounding a formal diagnosis, we find it unnecessary to insist on it; we are rather inclined to provide parents (and other professionals working with a child, e.g. teachers, educators) with clear information on the child`s objective difficulties at an early age in order to avoid wasting valuable time before offering support to the child and family.

Case 1

A boy is brought to psychological assessment for the first time at the age of 23 months. During the first interview with the child it is relatively difficult to get him to cooperate and to point his attention in the desired direction. A rather poor social contact is established with him at that time; he would make eye contact with the examiner only after being urged to. The scale for the assessment of psychomotor development was applied and the results showed a satisfactory development of coordination, while the development of motor, verbal and social skills was delayed. The boy would often be fidgeting and giggling. Parents stated that he would get upset by noise and certain sounds (e.g. those made by electrical appliances) and that he would sometimes seem aloof. The parents were given information on the profile of their child`s development emphasizing the importance of providing intensive stimulation to the child. Activities were particularized that could be performed with the child during the usual daily routine (e.g. insisting on visual contact, giving simple verbal instructions, being involved in play activities together with the child). It was also pointed out that some activities in which the child was engaged for longer time periods needed to be reduced or completely left out (e.g. lengthy cartoon watching, constant availability of electronic appliances the child was fascinated with, such as the computer, or mobile phone). After that, the child was brought in for further evaluation every 3-4 months in order to keep track of his development and to provide the parents with pointers on how to stimulate their child in the home environment. Parents were very compliant, they followed the pointers enthusiastically, and recognized areas in which the child was functioning in a satisfactory manner. The child`s difficulties were also discussed. The parents were encouraged to enrol the child in a kindergarten as well as to consult with a special education expert.

At the moment, the child is 2 years and 11 months. He is attending kindergarten. The boy`s teachers are informed on the difficulties he has (weaker interest in other children, less developed verbal skills, motor clumsiness). They do not insist on his involvement in all activities with other children but encourage him to participate in some. During the day he still likes to be alone and to play by himself. He seems to enjoy certain stereotyped activities, like spinning in circles and singing. He does not like to be touched by the psychologist, but enjoys cuddling with his mother. His motor skills are inept compared to those of his peers; he runs awkwardly, only pushes his bike and does not succeed to turn its pedals, even when helped by parents and when both training wheels are on the bicycle. He likes to get on the slide, but is clumsy climbing it. His constructive praxia is slightly delayed for his age; he manages to build a tower of 8 blocks but not a bridge. Puts together a puzzle made of two parts. Points to body parts, and when presented with picture material, points to specific objects. Understands and completes simple verbally given tasks. He is fascinated by letters and can point to all letters of the alphabet when presented one by one, but also when seen in a text. Speech is underdeveloped; he only uses three clear words with correct meaning.

Parents comply with all the instructions and pointers given by the psychologist and the special educator involved in the supportive treatment of the child. They understand the importance of intense stimulation for their child and are encouraged by his progress. They seem sensitive to his developmental needs.

Case 2

A boy is brought in for a psychological evaluation for the first time by his mother at the age of 5 years and 5 months. Anamnestic data shows that he only started kindergarten 6 months ago since he was not talking clearly, so they were reluctant to enrol him. In the group he is calm, has few spontaneous contacts with other children, but accepts to get involved in group activities when encouraged. Parents fail to provide reliable information; even though they seem to be concerned that something is “not right with him”, they tend to find excuses for everything (e.g. “He does not play with other children because he is an only child and there are no children his age in the neighbourhood” or “He used to watch a lot of TV because he was sickly and we would put him in front of a TV set to calm him down, so that`s why he now enjoys watching TV for hours”). The boy is extremely interested in city maps, knows almost all streets by heart and spends hours studying them. Parents inform us that his fascination with maps started over a year ago when he was given a cardboard game with streets and vehicles that moved in them. They also state that the boy is uninterested in motor activities, or playing in the park, but could sit and look at picture books for hours. The boy establishes verbal contact with the examiner, and seems cheerful and endearing. As soon as he completes a task he is given, he starts rolling his hands in a stereotyped manner. His speech is inappropriately articulated, mostly incomprehensible for his social environment making communication with him labored. Parents do not accept the recommended special education treatment because they find that the child is doing much better since he has started kindergarten.

The parents bring the child for his next psychological evaluation only a year after the first one, upon being urged to by the speech therapist they had been seeing for treatment of his poorly developed speech. Parents inform us at that time that the child is involved in a pre-school program and that he likes it very much. During psychological evaluation, he is cheerful, accepts to do all the tasks he is presented with by the examiner, and cooperates fully. His speech is mildly agrammatic, with unusual prosody. When excited, he resorts to stereotyped finger movements, which were already seen during his previous visit. His scores on the Wechsler intelligence scale show extremely disharmonic cognitive functioning. Verbal skills fall into the category of average, while nonverbal are in the borderline category (lower end). The inter-test scatter is uneven with a distinct rise in short-term memory, and fall in understanding social situations. Fine movement coordination is disturbed.

Even upon pointing to several areas in which the child experiences difficulties, parents avoid conversation on the possible course of action which would include providing the child with additional support. They find his speech difficulties to be responsible for his not socializing with other children. In their home environment, they keep encouraging his quest for information, and are reluctant to accept any of the suggested strategies that would help the child develop his social skills more. Of all the professional help offered to them, they only accept to work with a speech therapist.

Case 3

A girl aged 11 years and 4 months is brought for a psychological evaluation by parents who state that she expressed a desire to talk to a psychologist as she is constantly tense and unable to relax, especially in school when she is with other children. The case history shows that she was reluctant to socialize even at a young age and needed constant encouragement to be in the company of other children. In kindergarten she kept to herself, although she was well behaved and compliant in all activities that were being done (constructing different things, etc.). She never enjoyed recitals and refused to participate in them. She was rather insecure in social situations (e.g. when she was asked to run an errand by herself). When she was younger, she used to have "unusual" body movements (stereotyped movements). At present, the girl expresses a wish to hang out with peers and tries to fit in, but is unable to be spontaneous and fails to establish communication with other children. She states that others never invite her to come along anywhere (e.g. she was left out when all the other children went to the movies). In her home environment she is prone to impulsive behavior and often appears to be dissatisfied. She frequently asks her parents to play with her, and has violent outbursts if they refuse. She is extremely harsh toward her younger brother, imposes her own rules in every game they play together, and can be aggressive if he takes the slightest little thing that belongs to her. In everyday activities (meals, dressing, being independent) she is exceptionally slow and careless.

In the first contact with the girl, the observer is struck by her very serious look, and the avoidance of visual contact, although when questioned she answers clearly. Her manner of speaking is conspicuously formal and meticulous, with unusual prosody. She elaborates her answers extensively. She points out her interest in reading and computer games. When her intellectual abilities were assessed using a Wechsler type test, she scored highly above average, her verbal skills being superior to non-verbal. The inter-test scatter showed high achievement in general knowledge and short-term memory, while her understanding of social situations was slightly below average.

Her parents tried out different approaches to her behavior, from e.g. tolerating her impulsive actions to punishment. They often shouted at her because they felt that she ignored their demands. They used to encourage her to play with other children far more, but now they realize how tense and anxious that makes her, so they stopped. The parents` attitudes toward her are often in discord. They seem worried and underline that they are in a continuous state of stress due to the labored relation they have with their daughter, but they also notice how hard it is for her to fit in with a group of peers.

Case 4

The boy is brought for psychological evaluation for the first time at the age of 4 years, 6 months. He had started kindergarten where he was very poorly involved in mutual activities with other children. Parents justified his behavior with the child's marked motor clumsiness. It was hard for him to accept new activities and demands. He made sentences, but his voice had specific modulation. He often spoke of himself in third person. He developed his own words for certain things and used his own language extensively. Other children found it difficult to understand him and avoided interacting with him. During our initial encounter he played with bricks for a long period of time, not allowing for the game to be interrupted. He responded adequately to simple questions. The overall communication with the child was poor. The compliance quality during psychological testing did not allow a complete assessment of cognitive status to be made, although no significant delays were observed in this area. He was scheduled for check-up the following month, until when the parents were asked to note the child's peculiar behaviors and interests. Nevertheless, the following appointment did not take place until the boy had started second grade of primary school, at the age of 8 years, 2 months. Ever since he started school he displayed difficulties in respecting school rules. He would get up during class, walk around the classroom and ask questions. Children often teased him, made jokes about him, frequently on account of his peculiar accent. He successfully mastered school classes and was particularly good in mathematics. During recess he was usually alone. Under parental pressure he tried to initiate spontaneous conversation with other children but his topics were odd (the child had wide encyclopedic knowledge of nature and planets and he often spoke of these subjects elaborately with other children, failing to notice that they did not share his interests). He did not understand jokes or metaphorical significance of verbal messages. The parents were made aware of the basic characteristics of their child's problem; further tests were suggested as well as treatment, which they rejected. They could not accept the meaning of the child's social and emotional problems and felt that his time would come because he was "most certainly the cleverest child in class" and that others were reluctant to accept his knowledge on account of being far behind his level of intellectual development.

The boy is currently 13 years, 10 months of age. The incentive for visiting a clinical psychologist at this point derives from an event that took place in school where he was constantly approaching a girl trying to engage her in conversation. She reported this to her parents (she was allegedly very scared) because she could not avoid him since he was very persistent in trying to establish contact with her. The boy's parents were summoned to school where his behavior was described as insolent and poor mannered. The psychologist performed a standard testing of intellectual skills. The test results showed average intellectual capacities, with a noticeable predominance of verbal vs. nonverbal capacities. His speech is conspicuously rich in mannerisms; his voice has an unusual tone and intonation. Marked social immaturity is established through inadequate understanding of social rules and situations. The boy's parents consent to take him to a child psychiatrist who diagnoses him with AS.

FINAL CONSIDERATIONS

Accurate identification of children with AS is often challenging and usually delayed due to misperceptions and misinterpretations made by professionals as well as parents. The disagreement between experts whether it is a milder form of autism, a separate disorder or just a different cognitive style, complicates reaching a common stand concerning AS. The prolonged time needed to recognize children with AS presents a challenge for clinical practice, especially from the standpoint of offering timely therapeutic support and educating both the parents and the children in strategies intended to help the children function at an optimal level. Parents, but also professionals working with children, e.g. teachers and educators, are frequently insufficiently informed on the condition. This leads to misinterpretations and delays in offering appropriate assistance to the child. Thus, a lack of social skills can be erroneously explained by insufficient experience, and verbal skills and specific knowledge by superior intelligence (Aleksić-Hil et al., 2009).

The cases we demonstrated point to great significance of establishing adequate cooperation with parents. They are usually the first to notice that a child has a problem, one that becomes especially evident in a group of peers. It is important to realize the parents` attitude towards their child`s difficulties. In some of the cases shown, it is clear that parents find it extremely hard to understand and accept the child`s condition. However, if they were to respond sensitively to their child`s needs, it is necessary for them to accept his/her condition both cognitively and emotionally (Oppenheim, Koren-Karie & Yirmiya, 2009). Just then will they be able to provide support to their child, as well as to seek out and accept therapeutic interventions available from professionals. The importance of timely recognition of the child`s difficulties, and their need for guidance and support lies also in preventing secondary problems, such as pronounced anxiety and depression which can occur in children with AS due to their own perception of inadequacy, isolation and failure to fit in.

Apart from the importance of timely recognition of children with AS features, it is necessary to have a developed system of early interventions which would allow the affected children to develop their lacking social skills and reach better social adjustment. The accent is put on therapies and strategies intended to enhance the child`s global functioning, reduce anxiety, and improve behavior. The focus of attention should be placed on adaptive functioning, which refers to capacities for personal and social competence in real-life situations. A large discrepancy between intellectual and adaptive levels indicates that a priority should be given to instruction within the context of naturally occurring situations in order to foster and facilitate the use of skills intended to enhance quality of life (Klin, 2003). This would provide adequate assistance to both parents and their children in coping with AS. Better understanding of children with AS and offering them well-timed and adequate support, would give them a better chance to reach their full potential.

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SECONDARY CONSEQUENCES OF SPECIFIC LANGUAGE DISORDER – BIHEVIORAL PROBLEMS IN EARLY CHILDHOOD[a]

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SUMMARY

Children with specific language disorder exhibit a wide range of linguistic and non-linguistic difficulties. Behavioral problems are often frequent companions of specific language impairment. The aim of this study was to determine the presence of autistic features, behavioral problems and behavioral functions in children with specific language impairment.

The sample included 31 respondents, aged between 4 and 6 years. For identifying the presence of autistic features in behavior the Pervasive Developmental Disorder Mental Retardation Scale (PDD-MRS, & career of de Bildt, 2005) was used, and for collecting data about motivation for outbursts in behavior the Motivation Assessment Scale (MAS, Durrand & Crimmins, 1988) was used.

The obtained results show that in ¾ of respondents with specific language impairments there are extreme autistic features in behavior. Behavioral problems occur in over 87% of the sample, and are usually motivated by material and sensory motives. It is also obtained that a greater presence of autistic features indicates more frequent behavioral problems with sensory function.

Key words: function of behavior, speech and language problem, early development

INTRODUCTION

Specific language impairment

Even though there are data that testify that the first simplified descriptions of specific language impairments in literature has been used since 1835, this phrase has been officially used since the beginning of the eighties of the last century (Glumbić, 2010). Specific language impairment stands for a condition characterized by significant disorders of speech and language skills, whose causes can not be found in intellectual functioning, neurological disorders or hearing impairments (Leonard, 2000).

Children with specific language impairment exhibit a wide range of linguistic problems in different spheres, for example, the ability to understand speech (Krstić, Vidović & Vuković, 2011), lexical-semantic abilities (Milošević & Vuković, 2011), syntactic abilities (Павловић & Вуковић, 2014), the area of phonological awareness (Čolić, 2015), verbal memory (Богавац, Јеличић Добријевић & Ракоњац, 2014) and narrative abilities (Arapović, Grobler & Jakubin, 2010; Grobler & Arapović, 2006).

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However, specific language impairments are followed by many other non-linguistic disorders such as motor difficulties (Ullman & Pierpont, 2005), the problems of mental representations (Kamhi et al., 1990; Leonard, 2000), working memory deficit (Montgomery, 2003), and difficulties of perceptual processing of stimulus sequence (Leonard, 2000) (all according to Glumbić, 2010). In an effort to reveal common ground for all linguistic and non-linguistic problems that accompany specific language impairment, the authors usually consider two possible hypotheses. First, *the hypothesis of global deficits*, which represents too generalized assumption that each developmental disorder can be seen in the light of a more general disorder in receiving and processing information. On the other hand, *the hypothesis of procedural deficits*, suggests that abnormal development of brain structures responsible for procedural memory, leads to the development of clinical picture for specific language impairment (Glumbić, 2010).

The authors mostly agree that the specific language impairment in the general population is present in about 6-8% of cases, and that is somewhat more common in boys (Glumbić, 2010; Tomblin, Records, Buckwalter, Zhang, Smith & O'Brien, 1997), however, there are allegations that the prevalence is slightly higher and raises up to 10% (Hartley, Hill & Moore, 2003). To the category of non-accompanying manifestations of specific language disorders includes behavioral, emotional and social problems.

Behavioral problems

Speech and language problems make the communication with the environment difficult and contribute to the development of inappropriate behavioral patterns (Ljubešić, 1993). The severness of speech and language disorders, as well as the type of disorder can pose significant predictors of behavioral manifestations in the field of attention and aggression in children with specific language impairment (Puglisi, Cáceres-Assenço, Nogueira & Befi-Lopes, 2016; Van Daal, Verhoeven & Van Balkom, 2007; van Agt, Verhoeven, van den Brink & de Koning, 2011). Children with specific language disorder more often than their peers exhibit problems in the field of behavior and self-regulation (Fujiki, Brinton & Clarke, 2002; Brownlie et al., 2004; Lindsay & Dockrell, 2000; McCabe, 2005; Puglisi et al., 2016) but also show an increased propensity for emotional expression (Beitchman et al., 2001; Conti-Ramsden & Botting, 2008; Gregl, 2015, Puglisi et al., 2016) and psychiatric problems (Clegg, Hollis, Mawhood & Rutter, 2005; Cohen, Barwick, Horodezky, Vallance & Im, 1998).

According to the perception of parents and educators, children with specific language impairment commonly manifested problems with concentration, attention and impulsivity, while the most common behaviors are: 1. *He/she requires a lot of attention*, 2. *He/she can not concentrate and retain attention*, 3. *This child`s feelings can easily be hurt,* 4.*He/she can not stand waiting and wants all right away*, 5. *He/she can not sit still, the child is hyperactive* (Gregl, 2015).

Lindsay et al. (Lindsay, Dockrell & Strand, 2007) suggest that while studying behavioral problems in children with specific language impairment one should take into account two factors – the context in which the problems occur and the time (age) in which they manifest, believing that these two factors may contribute to the variability of results. Accordingly, these aforementioned authors believe that parents report more intensive problems in the home environment when compared to the reports of teachers in the school context, as well as that in the parent`s reports the trend of growth of problems is observed in the period from 8-12 year, while in the teachers' reports the case is reversed (Lindsay et al., 2007).

Analyzing behavioral problems in children with specific language impairment, Redmond & Rice (2002) came to the conclusion that they require constant monitoring because they are volatile over time, so the occurrence of the reappearance of behavioral outbursts can be expected in each new transition (e.g. when starting school, changing schools, etc.), or problems can be changed and transformed (e.g. a child with a high level of social withdrawal may begin with presentation of externalized behavior).

Autistic characteristics

Traditional views on the full diversity of specific language impairments and autistic disorders in the last twenty years have been questioned (Conti-Ramsden, Simkin & Botting, 2006). In addition to that, many findings confirm that autistic disorder is ten times more likely to develop in children who had a diagnosis of specific language impairments in early age (Conti-Ramsden et al., 2006), as well as statements that the boundaries between these two disorders are unclear and that it is necessary to dimensionally overview their relationship (Bishop & Norbury, 2002). Gregl (2015) in his research states that the characteristics of autism occur in 44% of subjects, and that they represent the most dominant clinically significant severities of this disorder and that therefore can be regarded as an integral part of the clinical picture of a specific language disorder. Similar results were obtained by Leyfer and associates (Leyfer, Tager-Flusberg, Dowd, Tomblin & Folstein, 2008), indicating that the autistic traits appear in 41% of their sample of children with specific language impairment.

By analyzing the literature, Durkin & Conti-Ramsden (2010) in which social interactions of children and youth with specific language impairments were studied, they found that these people rarely communicated with their environment, achieved cordial relations to a lesser extent, they were less responsive to the initiative of others, and generally exhibited poor social skills compared to their peers of typical development. Also, Leyfer et al. (2008) found some overlapping symptoms in the social sphere in children with autistic spectrum disorder and children with specific language impairment (e.g., difficulty in expressing social interests, achieving eye contact, spontaneous imitation, etc.). However, these authors believe that social problems in children with specific language disorder may not always be interpreted as autistic features, but as a result of social problems. Overlapping symptoms are rarely observed in only one area of repetitive and stereotyped patterns of behavior (Leyfer et al., 2008).

Aim

The aim of this study is to determine the frequency of the presence of autistic characteristics, behavioral problems and behavioral functions in children with specific language impairment.

METHOD

Sample

The sample of research included 31 respondents, aged between 4 and 6 years. All respondents live in the family homes and attend preschools in the territories, the City of Belgrade.

Table 1 *Sample structure in relation to gender*

	N	%
Male	28	90.3
Female	3	9.7
Total	31	100

Data on the age of the respondents are shown in Table 2.

Table 2 *Structure of the sample related to age*

M	SD	Min	Max
5.16	.735	4	6

All subjects were diagnosed with specific language impairments. Diagnostic data are taken from their personal charts, with prior obtained informed consent of their parents. Eight subjects were of no verbal production, while the remained 23 manifested emphasized difficulties in verbal expression.

Procedure

After gathering the sample, and obtaining informed consent, both by the parents of the respondents, as well as managers of the institutions in which the research was conducted, the assessment was conducted. The survey was performed during the 2015 in pre-school institutions on the territory of the City of Belgrade. The survey used instruments that do not require direct assessment, but are based on information given by other persons who are familiar with subjects. Data were collected from informants who were members of the professional staff in institutions whose beneficiaries were the subjects included by the sample.

Instruments

Determining the presence of the characteristics of autism

To identify the presence of autistic behavioral characteristics the Pervasive Developmental Disorder Mental Retardation Scale, PDD-MRS, & career of de Bildt, 2005 was used. This scale represents the screening and classification instrument, aimed at people aged two to 70 years of age (hereinafter referred to highlight this instrument the acronym PDD-MRS will be used). Scale PDD-MRS includes 12 items that assess the presence of adequate and maladaptive behavior patterns among the respondents. Areas that are subject to the assessment of this instrument are: social interaction, speech and language, stereotyped behavior, obsessive interests, as well as the expression of anxiety and panic. By typing the characters "+" or "-" the assessor estimates the presence or the absence of a behavior.

For answering the scale PDD-MRS it is necessary to have between 10 and 25 minutes. Position of given pluses and minuses determines the manner of adding value in order to obtain the five raw scores, which are by further, clearly defined computational procedure, converted to PDD-MRS total score. The value of PDD-MRS total score can range from 0 to 19. The Respondent has no pervasive disorder, if the score ranges from 0 to 6; if the value of the score is between 7 and 9, we talk about the suspicion of the presence of pervasive developmental disorders, while the value of 10 to 19 indicates the presence of a pervasive disorder. The psychometric characteristics of this scale have been tested on a sample of 1,230 respondents were operating at different levels of intellectual disability. The high values for sensitivity (92.3%) and the specificity of the scale (92.4%) are obtained. (De Bildt, Sytema, Kraijer & Minderaa, 2005).

Data for the PDD-MRS for the purposes of this study were collected from teachers who knew the respondents at least six months, achieving direct contact with him on a daily basis.

Assessment of motivation

The Motivation Assessment Scale (MAS, Durrand & Crimmins, 1988) is a fast, user friendly, indirect instrument for assessment that assesses motivation in behavior problems. MAS consist of 16 items which describe the situations that can lead to changes in behavior. It is expected from the informant to complete how often (from never to always) there is a change of behavior in different situations. By collecting responses obtained scores suggesting that the dominant feature of behavior.

The resulting value of Cronbach's alpha coefficient in this study is .908, which according DeVellis` data (DeVellis, 2003) indicates a high internal consent.

Statistics

The results of the research were analyzed using the statistical package SPSS for Windows, version 20. For data processing the methods of descriptive statistics, T-test, and Pearson correlation coefficient were used.

RESULTS

The presence of autism characteristics in patients with specific language impairment

Table 3 shows the descriptive display the achievements of respondents on a scale PDD-MRS.

Table 3 *Average scores on a scale PDD-MRS for the whole sample*

Achievements on the PDD-MRS scale	M	SD	Min	Max
	9.29	4.27	1	18

The sample did not include subjects with a clinical diagnosis of autistic disorder development, as well as the diagnosis of pervasive developmental disorders. By applying PDD-MRS scale, 8 patients (25.8%) had no signs of autistic disorder of development, while 6 patients (19.4%) were under on suspicion of the existence of autistic spectrum disorders, and 17 (54.8%) of respondents met the criteria of this scale for the diagnosis of autism spectrum development. The obtained results show that respondents who have speech production also exhibited somewhat lower level of autistic characteristics in behavior (Table 4).

Table 4 *The expression of autistic characteristics in behavior in relation to the existence of the speech production*

		M	SD
Achievements on the PDD-MRS scale	With speech production	8.61	4.81
	Without speech production	11.13	3.04

The presence of behavioral problems in patients with specific language impairment

Informants reported that 27 (87.09%) of respondents show behavioral problems, while 4 (12.91%) of the respondents never have behavioral outbursts.

The presence of the different forms of motivation for the manifestation of behavioral problems in patients with specific language disorder is presented in Table 5.

Table 5 *The descriptive view of scores on MAS subscale for the whole sample*

MAS	M	SD	Min	Max
Sensory	10.27	5.99	1	24
Escape	9.23	6.12	0	18
Attention	6.04	5.94	0	19
Tangible	12.46	8.12	0	24

Table 6 presents the scores on the subscale of the MAS scale in relation to the existence of speech production. T test for independent samples found that respondents who do not have voice production have significantly more behavioral problems with sensory function.

Table 6 *The descriptive view of MAS subscale scores on the scale in relation to the existence of speech production*

MAS		M	SD	T test
Sensory	With speech production	8.67	5.72	t=2.19, **p=.038**
	Without speech production	13.88	5.19	
Escape	With speech production	8.72	5.99	t=.62, p=.537
	Without speech production	10.38	6.67	
Attention	With speech production	5.56	5.82	t=.61, p=.545
	Without speech production	7.13	6.46	
Tangible	With speech production	11.61	8.44	t=.78, p=.439
	Without speech production	14.38	7.83	

The relation between the presence of autistic characteristics in behavior and behavioral motivation in subjects with specific language impairment

The link between the presence of autistic characteristics and motivation in behavioral problems has been tested by Pearson correlation coefficient (Table 7).

Table 7 *Correlation of the presence of autistic characteristics and motivation in behavioral problem*

	Sensory	Escape	Attention	Tangible
PDD-MRS	.601**	.223	.535**	.261

**significance on the level of.01

DISCUSSION

The results show that in ¾ of respondents with specific language impairment there are extreme autistic characteristics in the behavior, whereby they are present in half of the respondents to the extent that indicate the possibility of the existence of autistic disorder itself, and nonverbal respondents show a greater propensity for expression of these characteristics. Similar data are found in the literature (Gregl, 2015). Based on these findings, we conclude that the majority of our respondents with specific language impairments do not manifest only speech-language impairments, but also behavioral problems (e.g., excessive and obsessive interests, stereotypes, depending on the routines and rituals, hesitant and unpredictable behavior, etc.) and social nature. The allegations of Glumbić (2010) are in accordance with these results, who finds that children with specific language impairment have some difficulty in recognizing the emotions of others, which further complicates the understanding of communicative intention, that they relatively often ignore voice incentives that violate the interpersonal space in the process of interpersonal communication, and that they avoid eye contact as well. Although, according to the traditional understanding of speech and language difficulties, there are common features of autistic disorders and specific disorders of language that, there are also studies showing that individuals with specific language disorders have difficulty functioning in the social sphere (Clegg, Hollis, Mawhood & Rutter, 2005). It is assumed that in order to achieve the many functions of language in social interactions, and that these speech-language difficulties may adversely affect the person's social skills of these. In this way, avoiding eye contact, which is considered a major symptom of autism spectrum disorder, which appears in children with specific language impairment, can be interpreted as the result of a lack of understanding facial expressions, and therefore the child does not direct its attention to the face, because it does not provide him enough quality information (Glumbić, 2010).

Behavioral problems occur in over 87% of the sample. Results of other studies regarding the presence of behavioral problems in children with specific language impairment vary, but generally indicate a high comorbidity, somewhere from 25% to 63% (Baker & Cantwell, 1982), or from 58% to 73% (Cantwell & Baker, 1987).

The results obtained in this study indicate that the most common behavioral incidents are motivated by material motives. Specifically, all respondents often have outbursts of behavior when they are denied to access their favorite toys, activities or food, or when these things are taken from them. Also, respondents most often stop with problematic behavior when the desired object is returned to them. By analyzing the most common behavioral problems in children with specific language impairment of preschool age, McCabe (2005) points out that low tolerance to frustration is often recorder, which can be correlated with the data from our research.

The obtained results show that a greater presence of autism behavioral characteristic also stands for more frequent outbursts in behavior which are financially motivated. Other authors (Balataxe & Simmons, 1988; Beitchman, Nair, Clegg, Ferguson & Patel, 1986; Cantwell & Baker, 1985, all according Ljubešić, 1993) also suggest the frequent association of behavioral and speech-language impairments in early childhood, considering that the relationship between these two phenomena is very complex and that it affects a large number of factors.

Verbal and nonverbal respondent significantly differ in sensory function of undesirable behavior, that is, nonverbal subjects often exhibit behaviors that are motivated by sensory motives. In these people outbursts of behavior occur when they are alone, without the physical presence of other people, and sometimes it seems as if certain behavior gives pleasure to the respondent and that he becomes oblivious to his surroundings during the outage. This finding is not unusual given that Taal et al (Taal, Rietman, Meulen, Schipper & Dejoncker, 2013) suggest that children with specific language impairment exhibit atypical behavior in the auditory sensory (63.8%), tactile (52.6%), the vestibular (51.7%), oral (46%), the visual processing (43.1%). Dunn (2001) points out that precisely the problems in the processing of sensory stimuli can result in outbursts of anger, impulsiveness, hyperactivity and oppositional disorders. We assume that the therapist's successful detection of behavioral functions and planning of adequate sensory diet could contribute to alleviating the problem behavior in children with specific language impairment.

Also, in this study the data obtain suggest that a greater presence of autistic characteristics indicates frequently behavioral problems in sensory function. This finding is not unusual, given that autistic spectrum disorder is often followed by different forms of sensory dysfunction, and as the most common phenomena hypersensitivity to various stimuli, unusually high or low activity level, as well as behavioral problems (Mamić & Fulgosi-Masnjak, 2012) are referred. Also, the survey results show that although children with specific language disorder have problems in the processing of sensory stimuli, these problems are more emphasized in the population of children with autism spectrum disorders, and that to their profiles on a small scale and qualitatively different (van der Linde, Franzsen, Ashton-& Barnard, 2013). So, van der Linde and colleagues (2013) found that children from autistic spectrum have pronounced difficulty in oral and tactile stimuli processing and modulation stimuli that are related to the position and movements of the body.

After the sensory and material motivation, motive of avoidance is on the third place. With this function respondents want to avoid a task or requirements that are placed before them.

The least frequently represented motive of behavior in these patients with specific language impairment is paying attention. These respondents have somewhat less behavioral outbursts because the adults around them draw attention to other children, or they cease pay particular attention to the child.

Having in mind that the respondents in our sample are average age of five, and that the adoption of all most relevant language structures should be completed by this age (Bates, Bretherton & Snyder, 1988, according to Povše-Ivkić, Krstić, Radosavljev, Vidović & Vuksanović, 2002), we can assume that the behavioral incidents occur very frequently as inadequate compensation or completion of a linguistic tool, but are also a result of social incompetence.

CONCLUSION

The results of this research show that children with specific language impairment exhibit behavioral problems at an early age and consequently do not require only treatment of speech and language disorders, but also adequate behavioral assessment and treatment. The high prevalence of behavioral problems among children with specific language impairment requires additional training of professionals, both in terms of diagnosis, as well as in the planning and implementation of treatment (Van Daal et al., 2007). Maggio et al. (Maggio, Grañana, Richaudeau, Torres, Giannotti & Suburo, 2013) suggest that maladjusted behavior can often mask the symptoms of a specific language disorders, and thereby complicate the process of an early detection.

The obtained results also indicate a high prevalence of autism characteristics in the behavior of children with specific language impairment, which further implies that the diagnosis may not be the only criteria for the selection of the intervention, and for children in which the autistic symptomatology and characteristics of speech and language disorders overlap require intensive treatment in the field of non-structural aspects of language, non-verbal communication, the social cognition (Leyfer et al., 2008).

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THE RELATIONSHIP BETWEEN VISUAL-MOTOR INTEGRATION AND SCHOOL SUCCESS FOR DEAF AND HARD OF HEARING STUDENTS IN ELEMENTARY SCHOOL

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SUMMARY

Visual-motor integration can be seen as ability to understand visual information, with purpose for that information to be used for tasks like drawing, writing, sports, using tools and accessories and other school activities. Connection between school success and visual-motor ability to integrate is set as our research goal.

The study sample consisted 30 deaf and hard to hear children, age between 8 and 16 years. We used Beery-Buktenica test of visual-motor integration, and the results are shown in raw scores. Students from 5th to 8th grade had higher score, 17,25 unlike younger students, whose average was 13,90, and the difference is not statistically significant (t=1,454; p=0,157). Students with medium hard hearing loss scored the most points at the test AS=20,75, less points were achieved by students with total deafness AS=20,00, next students with mild hearing loss AS=16,00 and students with severe hearing loss AS=13,80. ANOVA testing showed no statistically important differences in achievements based according to the hearing loss (F=1,769; p=0,167). The difference between students with cochlear implant (AS=19,44) and the students who wear hearing aid (AS=14,71) is statistically important (t=2,066; p=0,048). The results of ANOVA test showed that there is no connection between success on visual-motor integration and success in the area of mathematics (F=1,952; p=0,163) and native language (F=1,952; p=0,163), as for art and P.E. we have found (t=2,858; p=0,008); (t=2,197; p=0,037). Early identification of difficulties in visual-motor integration is important, because it leads to early treatment, which can significantly contribute to higher achievements in school.

Key words: deaf and hard of hearing students, visual-motor integration, school success

INTRODUCTION

Visual-motor integration is defined as integration of visual perception and motor presentation of perceived. We determine visual-motor functions on child as coordination of movement and perception, which allows child to create in space and to express in graphomotoric way. Difficulties in conducting visual-motor functions directly impact hand coordination which is under the visual control. Problems which best show difficulties in visual-motor functions are bad and messy handwriting, difficulties in space organization of writing, which affects success in school (Krstić, Dukić & Kovačević, 2010).

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Difficulties in visual-motor integration potentially affect all areas in person's life: social, academic, sports, professional. Because of a person's lack of visual tracking ability, it is very difficult to organize movements and objects in space.

Some of the signs which point to visual-motor integration problems are:

1. Messy drawing and writing.
2. Excessive use of eraser.
3. Don't admit mistakes.
4. Bad organization.
5. Incapability of following a line with a pencil.
6. Bad posture during writing.
7. Incapability in solving tests, even though they know the topic.
8. Absence of answer in paper.
9. Difficulties in coordination of numbers in mathematical columns.

Visual-motor integration disorder can be found under these names:

1. Developing abstraction
2. Graphomotor discoordination
3. Visual-perceptual-motor dysfunction
4. Nonverbal LD syndrome

As some children who are deaf and hard of hearing grow in conditions where they lack one of the most important stimulants (such as sound) from environment, some aspects of psycho-motor activity can be lower in comparing with children with normal hearing (Radovanović, Radić-Šestić, Karić & Milanović-Dobrota, 2013). The results of the study show that deaf and hard of hearing children achieve lower results on visual-motor integration test compared to children of typical development (Lotz, Kroese, Puffer & Osberger, 1986). Contrary to this are results of other studies where results of the visual-motor integration are similar to results of their typically developed peers (Spencer & Delk, 1989; Dodd, Woodhouse & McIntosh, 1992).

One study examined perception, visual memorizing numbers and motor skills between deaf and persons with normal hearing. It was determined that deaf persons are behind in all abilities, except in perceiving the difference in weight (MacMillan & Bruner, 1906).

Visual-motor integration skills are important due to their contribution to the normal development of manual dexterity, coordination, speed, balance, and writing (Dawson & Watling, 2000a). It is very important variable for children's handwriting skills. There are various factors like visual-perceptual, motor planning, motor memory, sequencing etc, but Sovic found that visualmotor integration is an important variable to a child's handwriting skills (Sovik, 1975).

Problems which contribute VMI are noticed at children with disability, and it is highly shown during drawing of geometric shapes (Thomas & Hacker, 1987). Children with disability have visual-motor in performing precise activity, such as using scissors, drawing geometric shapes, copying of the design, claims Tranopol.

Karlsdottir and Stefansson (2003) found that the correlation between the results of the VMI and the quality of handwriting tend to decrease with age.Other studies have been carried out among samples of children with identified disorders. Within a group of children (10 year-olds) composed of clumsy children and of dysgraphic children, Maeland (1992) investigated the relationship between the VMI and the quality of handwriting based on a dictation.

Volman, van Schendel, and Jongmans (2006) confirmed a significant relationship between visual-motor integration and the quality of handwriting with children who present developmental coordination disorder (American Psychiatric Association [APA], 1994).

Research purpose

The purpose of this research was to determine the connection between the ability of visual-motor integration and success in maternal language, mathematics, art and physical education with deaf and hard of hearing elementary school children. Besides, we were interested in influence of growth, level of hearing loss and the type of amplification on visual-motor integration abilities.

MATERIAL AND METHOD

Sample

The sample of this study consisted of 30 deaf and hard of hearing children, from 8 to 16, students of "School and dorm for deaf and hard of hearing children", and students of two elementary schools from Kragujevac. In relation to school age there were 10 (33%) students with lower school age and 20 students (67%) with higher school age ($\chi2= 3,333$; $p=0,068$). Relative to the gender, there were 17 male students (57%) and 13 female students (43%) ($\chi2=0,533$; $p=0,465$).

Variables of research

Independent variables are: age, level of hearing loss, type of amplification, success in maternal language, success in mathematics, success in art, success in physical education, while the dependent variable is the success of deaf and hard of hearing students on visual-motor integration test.

Research Techniques and Instruments

In the research, we used visual-motor integration test (*Beery VMI – Keith E. Berry, Norman A. Buktenica and Natasha A. Beery*), the longer form, intended for evaluating examinees from age 2 to 100 years. Test for visual-motor integration is consisted with 30 questions, arranged with lower to higher principle. It is required that a child draws certain object in specially framed empty space which is located under the required form.

The rules of the test are:

- It is required that a child sits properly
- Properly holds a pen
- Properly holds the paper with one hand, and with other one draws

Child received 1 point: if it completely and accurately draws the required shape, if draws the required shape half, for doing the task with help of examiner (examiner draws on his paper the same shape, and the child draws it looking at the examiners paper and drawing the shape on his own space), and if a child draws the required shape in a way that the lines don't cross over the frame.

Maximum number of points is 30.

Test ends if a child repeatedly draws 3 shapes wrongly.

Kronbach alpha coefficient for this research is 0,813.

Experimental procedure

The information on age, level of hearing loss, type of amplification, academic achievement in maternal language, mathematics, art and physical education were acquired from the school's administration. The test was applied individually in a classroom. We strive to ensure that every child has a sign language translation. If he or she needs it. The roles of visual-motor integration test asks requires from children to solve the tasks independently, and the examiner gives additional explanations, if it is necessary.

Data processing methods

Data received from the research has been processed with adequate statistical methods and actions. The measures of descriptive statistics, which we've used, are: percentages, arithmetical environment, standard deviations and the measures of calculating significance of difference between average value achieved in test; t-test and ANOVA test.

Processing data will be carried out on PC computer with using program: SPSSS 20 for statistical data analyze, EXCEL 2007 for data base and charts, WORD 2007 for text processing.

RESULTS OF THE RESEARCH

Students results relative to maternal language success

In Table 1 are shown the results which deaf and semi-deaf students have made at visual-motor integration test regarding to their mother tongue success.

Table 1 *Students' success in visual-motor integration test regarding to mother tongue success*

Visual-motor integration/ mother tongue/success	N	AS	SD	df	F	P
Excellent	8	19,88	4,39	2	1,952	,163
Very good	13	16,08	6,10			
Good	7	14,43	5,74			

The excellent grade students have been the most successful in visual-motor integration test, with 19,88 points made, next are the very good grade students, with 16,08 points, while the good grade students have made only 14,43 points.

Testing the ANOVA test, there has not been found any statistically significant differences when observing the mother tongue grade (F=1,952; df=2; p=0,163). Foreign research results show connection between visual-motor integration and quality of handwriting (Comhill & Case-Smith, 1996; Tseng & Murray, 1994; Weintraub & Graham, 2000). Quality of handwriting is just a segment which is used for completing the grade in mother tongue, and mostly at younger age, assumption is, that because of that reason there have not been found any differences at students' achievements in test.

Students results relative to mathematics success

Table 2 *Students' success in visual-motor integration test regarding to mathematics success*

Visual-motor integration/ mathematics success	N	AS	SD	df	F	P
Excellent	5	16,60	3,21	3	2,413	,092
Very good	8	20,88	3,60			
Good	12	14,83	6,44			
Sufficient	3	13,67	7,23			

Table 2 shows the results which deaf and semi-deaf students have made at visual-motor integration test regarding to mathematics success.

The highest success in visual-motor integration test, with 20,88 points, have made the very good grade students, next are the excellent grade students and 16,60 points, and finally the good grade students with 14,83 points. The worst result have made the sufficient grade students, only 13,67 points. With testing the ANOVA test, there has been statistically significant difference in students success (F=2,413; df=3; p=0,092).

Beery (1982) determined a high connection between visual-motor integration and success in mathematics, which confirms the other authors' findings (Kulp, 1999; Mazzola et al, 2003).

Students results relative to art success

Table 3 *Students' success in visual-motor integration test in regard to art success*

Visual-motor integration/art success	N	AS	SD	t	df	P
Excellent	23	18,04	5,51	2,858	26	,008
Very good	5	10,80	2,05			

Table 3 shows the results which deaf and hard of hearing students have made at visual-motor integration test in regard to art success.

The most successful in visual-motor integration test have been the excellent grade students, who have made 18,04 points, while the lowest success level have had the very good grade students with 10,80 points. T test determined that there have been statistically significant differences in achievement success in visual-motor integration test in favor of the excellent grade students (t=2,858; df=26; p=0,008).

Students results relative to physical education success

Table 4 *Students' success in visual-motor integration test in regard to physical education success*

Visual-motor integration/ physical education success	N	AS	SD	t	df	p
Excellent	24	17,67	5,70	2,197	26	,037
Very good	4	11,25	2,06			

Table 4 shows the results which deaf and hard of hearing students have made at visual-motor integration test in regard to physical education success.

The excellent grade students have made, on average, 17,67 points and they have been more successful than the very good grade students, who made 11,25 points. T test determined that there have been statistically significant differences in achievement on visual-motor integration test in favor of the students with grade excellent (t=2,197; df=26; p=0,037). Volman, van Schendel, and Jongmans (2006) have determined significant connection between BMI and handwriting quality with children who have developing disorder of coordination and physical education.

McHale & Cermak (1992), Sanghavi & Kelkar (2005) claim that if students don't have well developed visual-motor integration, it can affect their achievements in school and teachers can't be sure what they have learned and mastered. Results of our research are accordant to these findings, because better results at VMI test have made the students with higher grade in art and physical education.

The influence of age, level of hearing loss and type of amplification are shown in the following tables 5, 6, 7, 8 and 9.

Table 5 *Students' success in visual-motor integration test regarding to their age*

Visual-motor integration/age	N	AS	SD	t	df	p
From 1 to 4	10	13,90	5,51	1,454	28	,157
From 5 to 8	20	17,25	6,15			

Table 6 *Students' success in visual-motor integration test in regard to their gender*

Visual-motor integration/Gender	N	AS	SD	t	df	p
Boys	10	15,53	6,18	,617	28	,542
Girls	20	16,92	6,06			

Table 7 *Students' success in visual-motor integration test in regard to their level of hearing loss*

Visual – motor integration/ Level of hearing lost	N	AS	SD	df	F	p
Mild	2	16,00	,000	4	1,769	,167
Moderate	5	13,80	8,468			
Moderately difficult	4	20,75	1,893			
Difficult	14	14,29	5,810			
Profound	5	20,00	4,848			

Table 8 *Students' success in visual-motor integration test in regard to their type of amplification*

Visual-motor integration/type of amplification	N	AS	SD	t	df	p
Hearing aid	21	14,71	6,18	2,066	28	,048
Cochlear implant	9	19,44	4,47			

Table 9 *Students' success in visual-motor integration test in regard to their model of communication*

Visual-motor integration/model of communication	N	AS	SD	df	F	p
Signed language	11	15,36	5,732	2	,502	,611
Spoken language	11	15,55	5,989			
Total model	8	18,00	6,969			

Based on results at T test, it has been determined that there are no statistically significant important differences in achievement in visual-motor integration test between younger and older students (t=1,454; p=0,157). According to the research (Radovanovic et al., 2013) there have not been found any significant difference between boys and girls ' achievements at visual-motor integration test (t=,617; p=0,542). Also, comparing to level of hearing loss, there has not been significant difference in students achievements (F=0,916; p=0,470). We have not found any statistically significant differences when observing the model of communication (F=0,916; p=0,470). Hauser, Cohen, Dye, Bavelier, (2006) have claimed to find high correlation of writing and reading skills with deaf and hard of hearing students, also with academic achievements on copying of figures test, while at our research, the students, who use sign language, have had the lowest success level.

The only statistically significant difference has been determined between the results which students made regarding to the model of amplification, in favor of students with cochlear implant (t=2,066; p=0,048), which is according to the results which were collected by Horn, Davis, Pisoni & Miyamoto (2004).

CONCLUSION

The goal of our research is to examine the connection between success in school and achievement at visual-motor integration test with deaf and hard of hearing children who are in elementary school.

We examined visual-motor integration by re-drawing the simple and complex shapes. We examined the influence of independent variables (age, gender, hearing damage level, success at maternal language, mathematics, art and physical education, type of amplification, model of communication) on dependent variables.

Based on our research, we have concluded that success in art and physical education has significant role in solving this test, while success in mother tongue and mathematics has not been shown as statistically important.

While researching the age, gender and model of communication on visual-motor integration test, we have not found any statistically significant results. However, when examining the amplification in relation to visual-motor integration test, we have found significant statistical data.

The results of our research could open the space for new researches in visual-motor integration area of deaf and hard of hearing students. It would be particularly interesting to compare visual-motor integration abilities and success in school with deaf and hard of hearing students and the ones with typical development.

Visual-motor integration is the ability in which can be affected, so the results could contribute to working with deaf and hard of hearing children. There are certain activities that can be done before every class: certain exercises of attention, movements coordination, students can draw their fingers on the edge of the school bench, cut paper with scissors... In certain lessons they should practice writing, re-writing of shorter texts, which would be expanded in time and becoming more and more complicated, and also drawing and re-drawing simple shapes to more and more complicated ones, in notebook and sketchbook, as well as on blackboard. At physical education lessons, students can practice more some exercises for movement coordination, and at the end of other lessons, they can occasionally practice improvement of the motor ability.

The connection of visual-motor integration readiness between writing and academic success is a field which is not sufficiently examined in our environment. Considering that the level of physical activity with children depends on individual influences, influence of school facilities, parents and environment, and considering that students learn more through indirect experience in contact with environment and other people, educational process can’t be practiced and used only inside schools walls, or limited with tasks and contents which are predicted by a program. Actually, it should be constantly used in everyday life, not separating work from play, acting from thinking and knowledge from its everyday use in every days situations. The most important thing is, that if we notice a problem, we act instantly in order to improve reduced functions.

It is extremely important that parents notice and pay attention to irregularities in psycho-motor development at child, and that can be achieved with training and counseling parents, so that they recognize stagnation in psycho-motor development, who should they contact and what is the best way for them to help their child.

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MOTOR DEVELOPMENT ASSESSMENT IN CHILDHOOD[a]

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SUMMARY

Motor development is the most intense during the childhood period, and consequently, it requires the most of the attention and adequate monitoring. One of the reasons is the fact that each motor dysfunction has consequences on other developmental domains, and therefore, compromises overall psychomotor development. The aim of this paper is to, by examining the available literature extensively, allocate and present specific, widely used instruments of children's motor development assessment during the childhood period, created in order to identify developmental motor dysfunctions and disorders and designed to evaluate motor development itself. A literature review was conducted by searching electronic databases EBSCO, Science Direct, and Scopus. The references of identified studies were hand-searched for additional articles. For the purposes of this paper, five assessment tools were presented. These instruments were selected on the basis of the frequency of their use in research work and on the basis of availability of comprehensive and relevant information. In addition to the description of the structure and characteristics of instruments, for each of them, strengths are listed and limitations noted. It can be concluded that in order to get an adequate insight into the motor abilities and motor development in general, it is advisable to use more than one instrument of assessment. A comprehensive insight into all motor substructures is important from the aspect of the treatment of deficient or impaired motor functions and in terms of the determination of a child's motor potentials.

Key words: motor abilities, assessment, development, childhood

INTRODUCTION

Through development, a child achieves skills needed to meet numerous demands of everyday life and to cope with everyday tasks. The development allows continuous adaptation to different situations. Child development can be defined as a structuralization of cognitive, psychological and behavioral functions constructed by certain physical and biological characteristics, and by the maturation of central nervous system along with an exposure to various environmental factors (Cho, 2006, as cited in S. W. Kim et al., 2011).

There is a considerable disagreement in the literature on what developmental delays and developmental disorders imply. Developmental disorders, including developmental delays, are related to children with deviations in physical, intellectual

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and/or sensory development in relation to age and can be found in 5–10% of children (Kerstjens et al., 2009). Similarly, developmental delay implies a deviation in at least one of the developmental domains (motor abilities, perception, cognition, speech, behavior) whereby disabilities can have very heterogeneous manifestations (Petersen, Kube & Palmer, 1998). On the other hand, some authors describe the global development delay as a significant deviation in two or more development domains (gross motor abilities, fine motor abilities, cognition, speech and/or language, and socialization), and significant delay as performance that is two standard deviations or more below the normalized and age-appropriate performance, obtained by standardized diagnostic procedures (Shevell, Ashwal & Donley, 2003). In addition to differences in methods and assessment tools, as well as in diagnostic criteria, the data on the frequency of developmental disorders can be extremely variable due to these different views of experts on what is meant by developmental delays and disorders. However, regardless of all of these differences, the fact is that their frequency is not negligible.

Developmental disorders can be caused by different factors. However, they can be prevented or reduced by timely identification and early intervention. Early intervention implies early detection, diagnosis, and rehabilitation of children with developmental disorders. The primary goal of early intervention is certainly the improving of a child's competencies in all developmental domains by preventing, minimizing or reducing developmental delays (Potikj, Milichevikj, Nedovikj & Cakikj, 2011). Early intervention not only increases a child's developmental capabilities but also has an impact on the risks and consequences of a developmental disorder, including a child's disability and the consequences in both family functioning and family dynamics. Early intervention, in addition to the above, reduces the economic costs of society and the negative social consequences (Chen et al., 2002). The timing of early intervention starting is directly dependent on the timing of detection and clinical confirmation of developmental delay or risks for a delay. Early intervention can have a habilitation character, within the context of primary prevention. For that matter, it is placed before the occurrence of development delay and/or before the identification of developmental delays, in cases where there was a risk of it. Moreover, early intervention can have a rehabilitation character when focused on identified developmental disabilities in order to correct or to minimize their consequences (Potikj et al., 2011).

The insistence on early identification of developmental delays and disorders creates preconditions for using advantages of early intervention. At the same time, it puts greater challenges for screening and evaluation. Accordingly, many studies have been conducted in order to identify developmental disorders at the earliest stages of a child's development. As a result, many instruments have been developed for this purpose since then (Regalado & Halfon, 2001). Detection of developmental problems is far easier and more reliable if screening tests are used. Screening represents a brief assessment procedure undertaken with the aim to identify those children who require intensive and comprehensive assessment (Meisels & Provence, 1989). Developmental screening instruments include an assessment in several domains of development. Besides, it is recommended to create them as a relatively brief and cheap. A comprehensive multidisciplinary assessment of development is recommended for children with delays in at least two developmental domains (Tieman, Palisano & Sutlive, 2005).

It is widely believed that developmental disorders in children, particularly at an early age, are detected the most frequently and easily within the primary health care system. However, literature data do not support this view. According to the literature, 30–40% of school children in the United States of America have behavioral, mental or learning disabilities, and only 20–30% of these problems are detected before school (Boyle, Decoufle & Yeargin-Allsopp, 1994). Thus, some of the rehabilitation resources are irretrievably lost, further complicating the existing problem, with significant repercussions for the child, family, school and society as a whole.

The importance of motor development evaluation is even greater if motor development is seen as the basis for overall child development, regardless of its mutual conditionality with cognitive and emotional component in synchronized triad of psychomotor development. Motor development is the most intense during the childhood period and consequently, it requires the most of the attention and adequate monitoring. One of the reasons is the fact that each dysfunction in the motor domain has consequences on other developmental domains and therefore compromises child's psychomotor development in general. Precisely, this is the starting point of special education and rehabilitation of persons with physical disabilities.

The aim of this paper is to, by examining the available literature extensively, allocate and present specific, widely used instruments of motor development assessment during the childhood period. Selected are and presented those instruments that are created to identify developmental motor dysfunctions and disorders and designed to evaluate motor development itself. Therefore, this narrative literature review synthesizes the findings in this field in order to consider the existing possibilities of motor development assessment and to provide guidelines for future research and practical work.

METHOD

Basic search was conducted by Google Scholar – Advanced Search using the following keywords: assessment tools and developmental screening, in combination with the exact phrases: motor skills, motor abilities, and motor development. Next, abstracts of all collected articles were reviewed. Twenty-three instruments designed for the assessment of motor abilities of children under the age of six were allocated. An insight into the selected instruments' frequency of use in both scientific and research work was conducted through a comprehensive search of electronic databases (EBSCO, Science Direct, and Scopus). Additionally, the references of identified studies were hand-searched for additional articles. Research studies focused on the psychometric characteristics of instruments presented in this paper were added by further search of electronic databases.

As the search terms, full names of the instruments were used as syntagms with a defined prerequisite of appearing within the full text and the abstract. Search was limited to studies published in peer-reviewed journals in English from January 2000. The search yielded 487 titles. The titles and abstracts were reviewed using the inclusion criteria: 1) primary, original research, 2) preschool aged participants (or under the age of six), and 3) the assessment of their motor development.

The frequency of use of selected assessment tools was based on a total number of studies that had met the given criteria. Five motor development assessment tools designed for preschool children, along with their revisions and preceding versions were allocated as the most frequent and then presented in this paper. In addition, frequency of the most commonly used instruments was variable and ranged from 26, which was the frequency of the Test of Gross Motor Development-2 – TGMD-2 (Ulrich, 2000), to 103 as found in research studies that had used either one of the editions of the Movement Assessment Battery for Children – Movement ABC & Movement ABC-2 (Henderson, Sugden & Barnett, 2007; Henderson & Sugden, 1992). The frequency of remaining assessment tools presented in this paper was between these two values.

RESULTS

The second edition of The Ages & Stages Questionnaire – ASQ (Squires & Bricker, 1999) is designed to include a child's development through different stages and in different environments systematically, yet to remain adaptable to the specific needs of each family. This parent-report, age-graded developmental screening instrument is standardized for the age from four months to 60 months. Development is evaluated every two months during the first two years of life, and quarterly during the third year while the assessment is planned every six months in the fourth and fifth year. There is also the possibility of age adjusting during the first two years of life in case of premature birth. Each of the 19 subtests consists of 30 items which assess five domains of child development: communication, gross motor, fine motor, problem solving and personal-social. In addition, at the end of this instrument, the authors have suggested 20 different activities that are adequate for each developmental stage (from the age of four to the age of 60 month). Parents or caregivers may use these intervention activities suggestions in order to stimulate, and to further monitor their child's development. This tool has both discriminative and evaluative character. It can be used as an instrument for detection of children with developmental disorders, as well as for assessing the need for further monitoring or involvement in programs of early or preschool intervention. At the same time, it can be used as an instrument for developmental evaluation of a child at risk or with developmental delays. However, different psychometric characteristics can be found in the literature, primarily according to the method of administration or the environment in which this questionnaire is completed. When the questionnaire was distributed by mail, the sensitivity of 90%, specificity of 77%, positive predictive value of 40% and negative predictive value of 98% were noted (Skellern, Rogers & O'Callaghan, 2001). Therefore, the authors have recommended that this instrument should be considered for screening of cognitive and motor development disorders in prematurely born children. Similar recommendations were presented by other authors (Kim & Sung, 2007). On the other hand, the sensitivity of 67%, specificity of 39%, positive predictive value of 34% and negative predictive value of 71% were found in situations where a parent or caregiver of a child completed questionnaire in waiting rooms of pediatric clinics (Rydz et al., 2006). Based on this, it was concluded that not all necessary preconditions for a screening instrument were fulfilled. In a study conducted in Taiwan on a sample of 101 participants aged between 34 and 38 months (Tsai, McClelland, Pratt & Squires, 2006), the highest reliability, measured by Cronbach's alpha coefficient, was noted in the communication subscale (0.91) and the lowest in the socio-emotional development subscale (0.83). The reliability of this instrument for screening purposes is confirmed, however, greater caution is recommended when interpreting the developmental differences between boys and girls with regard to the instrument's insufficient sensitivity to gender differences (Richter & Janson, 2007). Moreover, the predictive value of this screening instrument is proven when it comes to severe school difficulties at five years of age in preterm-born children (Halbwachs et al., 2014). Despite the expected, it was not confirmed that ASQ could identify additional developmental delays in young children with bilateral sensorineural hearing loss aged from six months to 36 months (Wiley & Meinzen-Derr, 2013).

The third edition of The Ages & Stages Questionnaires – ASQ-3 (Squires & Bricker, 2009) brings certain innovations and improvements. Subtests for the age of two months and nine months were added, and some questions are open-ended. In addition, developmental activities for the period from the first to the fourth month, and for the period from the 60th to 66th month of life are proposed. The questionnaire was standardized on a sample of 15,138 participants aged from birth to 66 months (47.4% female and 52.6% male). Reliability of this instrument was measured by Cronbach's alpha coefficient in the following developmental domains: communication (from 0.57 to 0.83), gross motor skills (from 0.57 to 0.87), fine motor skills (from 0.51 to 0.83), problem-solving ability (from 0.53 to 0.78), and socio-emotional development (from 0.51 to 0.71). Test-retest reliability, measured after two weeks on a sample of 145 participants, was 92% while interrater reliability was 93% (between parents and professionals). The authors have further emphasized that this version of the questionnaire is statistically more sensitive to developmental differences than the previous one (Squires & Bricker, 2009). The high sensitivity (82%) and specificity (78%), moderate sensitivity and specificity across age subgroups were confirmed on a sample of 334 children aged 12 to 60 months (Limbos & Joyce, 2011).

As confirmed, ASQ-3 is reliable developmental screening instrument that can be used to screen children for developmental delay in the waiting room of pediatric practices (San Antonio, Fenick, Shabanova, Leventhal & Weitzman, 2014). In this research, the starting point was the observation that developmental screening instrument were often used in nonstandardized conditions although validation was conducted under standardized conditions. Therefore, the reproducibility of ASQ-3 under nonstandardized conditions was compared with standardized conditions (San Antonio et al., 2014).

The Child Development Inventory – CDI (Ireton, 1992) is a result of the revision of The Minnesota Child Development Inventory – MCDI (Ireton & Thwing, 1972) that was primarily created with the basic idea to collected data on the developmental status of children aged one to six years from parents. During the many years of clinical and research work, a set of items was improved, and more representative samples for both norming (n=568) and standardization (n=887) were provided. Besides, CDI is adjusted for children from 15 to 78 months of age, although it can be used for assessing the development of older children and children with lower functional abilities (Ireton, 1992). Children's development is assessed through a total of 270 items grouped into eight scales: Social, Self Help, Gross Motor, Fine Motor, Expressive Language, Language Comprehension, Letters, and Numbers. General Development is a ninth scale and it consists of 70 items. In the last section, which consists of 30 items, parents or caregivers note down various problems and symptoms that are related to their child's vision and hearing, health, eating, sleeping, and toilet training, as well as "clumsiness" or other motor coordination disorder, speech and language disorders, attention-activity problems, behavior problems, and emotional problems. Both Gross Motor and Fine Motor Scale consists of 30 items each. Most items are designed to assess gross motor development during the second year of life, and fine motor development during the third year of life, that is ten, and seven items. On the other hand, gross and fine motor development are assessed by only one item each after the fifth year of life, by one item for gross motor development at the age of six and by none at the same age when it comes to the domain of fine motor development. Graphical representation, given in the form of The Child Development Inventory Profile, clearly illustrates the present level of development in the domains evaluated according to established norms. Therefore, this profile provides insight into the child's developmental potentials, and into the deficient developmental domains. However, it should be noted that statistically significant gender differences were found in a total of 32 items ($p < 0.01$). According to determined values of Cronbach's alpha coefficient, all scales have acceptable reliability, higher in those domains with a larger number of items. Report on the sensitivity of 0.50, specificity 0.86, positive predictive value of 50% and negative predictive value of 86% can be found in the literature (Rydz et al., 2006).

The Child Development Inventory – CDI (Ireton, 1992) is not the only assessment tool which originated from the revision of the original one, that is The Minnesota Child Development Inventory – MCDI (Ireton & Thwing, 1972). One of these assessment tools is The Minnesota Infant Development Inventory – MIDI (Ireton & Thwing, 1980) which is designed for the assessment from birth to 15 months of age in five developmental domains: gross motor, fine motor, language, comprehension, and personal-social. The high sensitivity of developmental delay detection (85%) and slightly lower sensitivity (77%) when it comes to the identification of normal development were confirmed (Creighton & Sauve, 1988). The second assessment tool is The Preschool Development Inventory – PDI (Ireton, 1988), a standardized instrument created to detect children with developmental, health or behavioral problems, and designed for children aged three to five years. The overall level of development is estimated in the domains of motor development, language development, self-help and social behavior. In addition, PDI consists of three sections in which parents describe their child, give their observations about the difficulties and report questions or concerns if they have any. The reported problems are then compared with the data recorded in the equivalent subscale, which all together, with a graphical representation, facilitate the interpretation of results and making a conclusion on whether there is a developmental delay or difficulty and in which domain is evident. The advantage of PDI is the acknowledgment of differences between boys and girls when it comes to the development of certain skills. This is achieved by the provision of a choice between numbers of items. In terms of validity, the PDI is more sensitive to general developmental deviations than to delays in different domains of development. At the same time, the PDI is the least sensitive to variations in the motor development and the occurrence of socio-emotional problems, unless they are extreme.

According to the literature, 11% of 220 participants between the ages of three and four years had a low score in the general development domain according to the PDI and were subsequently placed in early childhood/special education (Ireton, Diamond & Carney, 1993). At the same time, the presence of one or more symptoms as indicators of potential problems in learning at older ages was identified in 14% participants. The study was repeated on the same sample after two years. The sensitivity of 0.68, specificity of 0.88, and positive predictive power of 0.41 were calculated. In addition, the authors pointed out that a statistically significant matching of information obtained from parents and the results of professionals' assessment of a child's need for early childhood/special education was confirmed, as concluded in the subsequent study (Ireton et al., 1993; Ireton & Glascoe, 1995). However, not all studies have confirmed these findings. As an early detection tool, the PDI is not sensitive enough in predicting of academic performance in the lower school grades school considering that the PDI did not identify almost two-thirds of the children who were later unsuccessful in school (Schraeder, 1993).

The Test of Gross Motor Development-2 – TGMD-2 (Ulrich, 2000) is a standardized test for the qualitative measurement of gross motor abilities designed for children aged three through 10 years. The TGMD-2 is used to detect children whose gross motor development is significantly behind the age-expected one, for planning an instructional program in gross motor development, and for assessment and evaluation of individual progress and success of the applied program. It takes about 15 to 20 minutes per participant to fulfill the test. Both adequate space and equipment are necessary for testing (several different types of balls, cones, etc.). The TGMD-2 assesses 12 different gross motor skills and consists of two subtests. The first subtest evaluates locomotor skills (run, gallop, hop, leap, horizontal jump, and slide). The second subtest is focused on object control in several ways (two-hand strike, stationary bounce, catch, kick, and overhand throw). If the test is used for comparing the performance of children with the age-appropriate norms, then the examiner first clearly and precisely verbally describes each task, followed by an accurate demonstration. Next, the examiner should provide a practice trial to make sure that the child understands the given tasks, and an additional demonstration when necessary. Each motor task is performed twice, both performances are recorded, described and evaluated according to several given performance criteria (as a pass or a failed attempt). The examiner must carefully analyze the performance quality and maturity of movements according to age norms. The emphasis is on the sequences of motor performance, rather than on the outcome of the execution of motor task as a whole. The Gross Motor Quotient (GMQ), as a result of the scoring procedure, indicates an individual's current status of gross motor development. According to the author, the GMQ is a highly reliable indicator of development and a composite of both subtests. Higher scores indicate well-developed locomotor skills and object control skills while lower scores indicate the lower development of these skills. Total score and subtests scores are highly correlated with chronological age (0.81-0.87). In addition, children with developmental disorders have lower achievements than children with typical development. The advantage of this test is that the motor tasks are familiar and easy to explain and demonstrate, that testing itself requires a short time to administer, and that equipment and materials are inexpensive and easy available. The detailed criteria for successful performance and clear illustrations are given in the manual making a scoring procedure reliable and easy. It is possible to analyze each component of motor task separately and to determine the starting point for treatment of gross motor development more precisely. However, as the author himself says, there are several limitations that should certainly be kept in mind when selecting this assessment tool. First, the testing procedure requires a lot of space. Next, conclusions should not be made based on this test only as it doesn't provide a comprehensive insight into an individual's motor performance. Among other things, there are numerous factors to consider, such as poor motivation or inexperience, developmental disabilities, and others. The TGMD-2 was standardized on a representative sample of 1,208 participants from 10 different USA states. The validity of TGMD-2 in terms of its content and selected gross motor skills, predictive validity for certain activities, reliability in relation to different demographic characteristics of participants and in relation to the stability of scores over time (0.84-0.96) were confirmed (Ulrich, 2000).

In a study conducted in Flanders by Simons & Van Hombeeck (2003, as cited in Cools, Martelaer, Samaey & Andries, 2009), the authors came to the conclusion that there were cultural differences that affected the performance on the TGMD-2. These differences could explain significantly lower achievement of children in Flanders in comparison to children in the United States of America. As an example, the authors reported that both striking and overhand throwing items were highly related and typical to baseball and therefore potentially inadequate for standard use in different cultures (Simons & Van Hombeeck, 2003, as cited in Cools et al., 2009). However, this instrument is often used with the aim to evaluate basic motor abilities in a population of children with typical development (Cepicka, 2010; Evaggelinou, Tsigilis & Papa, 2002; Hardy, King, Farrell, Macniven & Howlett, 2010; Logan, Robinson & Getchell, 2011; Robinson, 2011; Williams et al., 2009) and in a population of children at risk (Robinson & Goodway, 2009). Moreover, TGMD-2 is applied in the assessment of children with various speech-language disorders (Visscher et al., 2010), developmental coordination disorder (Niemeijer, Smits-Engelsman & Schoemaker, 2007), attention deficit hyperactivity disorder (Harvey et al., 2009) and autistic spectrum disorders (Staples & Reid, 2010), as well as in children with visual impairments (Houwen, Hartman, Jonker & Visscher, 2010; Houwen, Hartman, & Visscher, 2009, 2010) or intellectual disability (Hartman, Houwen, Scherder & Visscher, 2010; Simons et al., 2007; Westendorp, Hartman, Houwen, Smith & Visscher, 2011; Westendorp, Houwen, Hartman & Visscher, 2011).

The Movement Assessment Battery for Children – Movement ABC (Henderson & Sugden, 1992) and Movement ABC-2 (Henderson et al., 2007) originate from The Test of Motor Impairment – TOMI (Stott, Moyes & Henderson, 1984) and The Oseretsky Scales for the Motor Capacity of Children (Burton & Miller, 1998), as stated by Cools, Martelaer, Samaey & Andries (2009). These norm-ranked assessment tools are designed for evaluation of basic motor skills development status with an emphasis on detection of delays or deficits in motor development. These tests are particularly useful when examining the problem of functional integration of motor control or in the detection of problems that could occur for the first time in the older preschool or early school age. Tests are adapted for children aged four to 12 years. This battery of tests consists of a total of 32 items divided into four age groups (4–6, 7–8, 9–10 and 11–12 years). Eight individual tests are constructed for each age group in order to measure three categories of movement skills: manual dexterity, ball skills, and balance skills (static and dynamic). Both quantitative and qualitative aspects of performance are recorded. It takes approximately 20 to 30 minutes to administer. Testing procedure requires no special training. The specific instruction, equipment, and description are given for each task. Each task or item is assessed on a 6-point scale (0 – best, 5 – worst). The sum is then converted to percentile. A larger sum indicates a lower achievement. A more detailed insight into the development status for each category of motor skills is provided through the profile of a child's motor performance and qualitative observations (optional), as well as through the comparison to normative tables. The authors recommend this battery of tests for program planning in educational or clinical settings, but also for an evaluation of corrective programs created for children with motor coordination disorders, as well as for various research purposes.

The first version of the test (Movement ABC) was standardized on a sample of 1,234 participants from the United States of America (Henderson & Sugden, 1992). The sample was stratified according to demographic characteristics, origin, and gender. The most important advantages of the test are visible in its cross-cultural validity and simple administration (Cools et al., 2009). The main limitations are the lack of specificity due to a wide range of age groups and to the low efficiency as seen in the time required to complete all the tasks in this test (20-30 minutes for eight tasks). However, the reliability and validity of the first version of this test were not evaluated in any additional, independent studies. The data on which its authors relied upon originated from studies on the reliability and validity of TOMI, regardless of the significant differences between their scoring systems (Wiart & Darrah, 2001). Further, in the focus are the skills presumed for each age, i.e. norms, while qualitative observations added in the revision do not have a substantive impact on the overall score, thus representing a description of difficulties that a child has during any given task. According to the conclusion of research conducted in Flanders, the Movement ABC is a reliable instrument for the detection of mild and moderate forms of motor disorders in preschool children (Van Waelvelde, Peersman, Lenoir & Smits Engelsman, 2007). However, during the research, the authors noted the systematic repetition of errors in measurement and the learning effect due to frequent repetition of tasks, and therefore recommended that this battery of tests should be part of a more comprehensive assessment.

The revised version, the Movement ABC-2 (Henderson et al., 2007) has brought some improvements. Namely, the age groups were expanded and reorganized (3–6, 7–10 and 11–16 years), certain requisites were changed and instructions were given more clearly and precisely. Some tasks were modified leading to less difficult monitoring and comparing of results between different age groups of children. Standardization is repeated, this time on a sample of 1,172 participants from Great Britain and Northern Ireland. The sample stratification was performed by geographical region, population density, social class and ethnicity. When motor performances of 32 participants average age of 4.2 years measured by the TGMD-2 and the Movement ABC-2 were compared, it was concluded that each of the assessment tools provided a similar overall picture of the motor skills of preschool-aged children, but still evaluated and provided different information on specific aspects of motor functioning (Logan et al., 2011). In the next published study that included 183 participants aged 36 to 64 months, specific aspects of both reliability and validity was presented for the first age group (Ellinoudis et al., 2011). Reliability for manual dexterity, aiming and catching, and balance tasks, assessed by Cronbach's alpha coefficient, were 0.51, 0.70 and 0.66, respectively. Test-retest reliability values were high for all the items with the exception of the drawing trail activity. All the test items were moderately, but statistically significantly correlated with the total score for this age group. At the same time, the score for each of the three developmental domains was highly correlated with the total score and moderately correlated with each other, additionally supporting the validity of the Movement ABC-2. As concluded, the results indicated that the Movement ABC-2 is a reliable and valid tool for the assessment of movement difficulties among 3–5-year-old children. Moreover, the Movement ABC-2 can be used to examine the effectiveness of motor intervention programs (Ellinoudis et al., 2011). For research and practical purposes, the Movement ABC-2 is the most commonly used in a population of children with developmental coordination disorder (Cairney, Hay, Veldhuizen, Missiuna & Faught, 2009; Dewey et al., 2011; Fong, Lee & Pang, 2011; Fong, Lee, Chan et al., 2011; Li, Wu, Cairney & Hsieh, 2011; Van Waelvelde, Oostra, Dewitte, Van Den Broeck & Jongmans, 2010; Venetsanou et al., 2011; Watter et al., 2008; Zhu, Wu & Cairney, 2011).

As one of the most commonly used assessment tools for fine and gross motor development, the original edition of The Bruininks-Oseretsky Test of Motor Proficiency – BOTMP (Bruininks, 1978) and the 2005 revision (The Bruininks-Oseretsky Test of Motor Proficiency – BOT-2; Bruininks & Bruininks, 2005) should be mentioned. Both tests are standardized, norm-referenced measures used in order to detect mild and moderate motor coordination deficits. The first version was designed for children aged four to 15 years while the second version was designed for children aged up to 21 years. The BOT-2 consists of a total of 53 items divided into eight subtests: fine motor precision, fine motor integration, manual dexterity, bilateral coordination, balance, running speed and agility, upper-limb coordination and strength. Tasks are given according to the severity, from the least to the most difficult ones within each subtest. Each subtest can be administered separately. The total motor score is calculated as the sum of individual scores (fine motor control, manual coordination, body coordination, strength, and agility). The age-based standard scores, percentiles ranks and age equilvalents are provided, along with the optional qualitative categories of motor performance. It takes 45 to 60 minutes to administer. The authors were guided by certain criteria when selecting motor tasks, such as the need to provide sufficiently broad and comprehensive overview of the motor development status in terms of motor skills. Next, the test was created as a representative in terms of motor behavior, pointing out potential vulnerabilities in motor skills, but also motor potentials of each child. Furthermore, the test was designed to emphasize motor activity as a whole but also to be sufficiently discriminative when it came to individual motor skills. It can be administered in a population of children with mild and moderate intellectual disabilities, and children with attention disorders or speech disorders. The BOTMP is often used in adapted physical education, and in occupational and physical therapy

(Burton & Miller, 1998, as cited in Cools et al., 2009). The revision has brought some improvements to the presentation of the items. The assessment of the youngest group of children (4–5 years) was upgraded, better coverage of gross and fine motor skills completed and better quality of associated equipment provided. The BOT-2 is recommended for the diagnosis of motor impairment, screening and early detection of motor disorders, treatment planning, development and evaluation of the effects of motor training, as well as and for different research purposes. The first version of the test (BOTMP) was standardized in the United States of America on a sample of 765 participants with typical development between the ages of four years and six months to 14 years and six months (Wiart & Darrah, 2001). The revision (BOT-2) was standardized on a sample of 1,520 participants from 239 different places across the United States of America, 510 of which were between the ages of 4 to 6 years (Bruininks & Bruininks, 2005). The sample was statistically representative. The validity of the BOT-2 was confirmed in a population of persons with developmental coordination disorder, with mild to moderate intellectual disability, with a highly functional autism and with Asperger syndrome (Bruininks & Bruininks, 2005). Discriminant validity of the test varies depending on whether subjects are persons with typical development or persons with different severity of developmental disorders (Cools et al., 2009). However, the test was not standardized on a sample of participants from Europe (Cools et al., 2009). The most common criticism of this test as an assessment tool refers to the fact that it requires a high level of knowledge in the field of medicine, which further complicates wider use. In addition, the time required for administration can represent as a problem for younger children. Therefore, assessment is usually carried out in two or more times in preschool children, with breaks in between, in order to complete the assessment process adequately (Peerlings, 2007, as cited in Cools et al., 2009). Both BOTMP and BOT-2 can be administered in their short (BOTMP-SF) or brief form (BOT-2 Brief Form) as instruments for screening and quick assessment of general motor skills. When it comes to an identification of motor disorders in five years old children, it should be noted that the validity of the BOTMP-SF was not confirmed (Venetsanou, Kambas, Aggeloussis, Serbezis & Taxildaris, 2007). According to the results presented, higher average total scores were obtained in the shorter version than in the longer one, and the lower sensitivity (13.6%) and negative predictive value (72.5%) were confirmed in identifying motor disorders.

DISCUSSION

There are several reasons why early recognition and detection of children with developmental disorders is crucially important. Primarily, it represents a basis for the early identification of developmental disorders and/or delays in development or some of its domains. Therefore, it allows early intervention, reducing the impact of developmental delays or disorders on the functioning of a child and its family, and preventing disability. If the prevention of disability is set as an objective, then a continuous and regular monitoring of child development imposes itself as a primary one in all systems, regardless of whether it is healthcare, education or social protection system. Consequently, further research on the accuracy and reliability of tools used for development screening and assessment are needed. Numerous procedures used in the process of evaluation of a child's development in general, as well as a child's motor development, are already developed and still developing every day. Their selection, besides on their reliability and validity, depends on the purpose of testing, child's characteristics, context, preferences, and experience of the examiner (Tieman et al., 2005).

With the aim to gain theoretical insight into the possibilities of motor development assessment during childhood, this paper presents five instruments with their revisions and versions from which they originated. Assessment tools that contain motor development items are selected based on the frequency of their use in scientific and research work and on the availability of comprehensive and relevant information on those instruments.

Three of the instruments presented (TGMD-2, Movement MABC and ABC-2, BOTMP and BOT-2) have been created solely for the purpose of assessing developmental delays and disorders in the domain of mobility and for the evaluation of motor development. The remaining two instruments (ASQ, CDI) provide insight into the overall development of a child, including the development of motor functions, abilities, and skills. It should be noted that three instruments (TGMD-2, Movement MABC and ABC-2, BOTMP and BOT-2) are standardized for the age that exceeds preschool, or, in other words, they can be used to assess motor development beyond the age of six years. However, this should not be taken as a significant limitation, in terms of the aim of present study. It is possible to assess development in the mobility domain with each of these instruments during childhood or until the age of six years, as the items (described in the review of instruments) are usually the same while only norms are different for different age groups. Next, two instruments (ASQ, TGMD-2) have discriminative and evaluative character, while the remaining only have a discriminatory character. All instruments presented are standardized, and studies with basic psychometric characteristics are listed for each one. In addition, strengths and some limitations are listed. This might be important to examiners when deciding or selecting an instrument in order to assess the status of motor development of children.

All the strengths and limitations of all instruments presented are highly variable. Furthermore, the fact is that it is overambitious to expect that it is possible to gain an insight into a very complex developmental domain, such as motor development during childhood, with a single assessment tool. For these reasons, we believe that it is necessary to use several instruments for an adequate assessment and evaluation of motor development, especially in children with the previously identified developmental delay or disorder. Particularly since the corpus of motor performances is understood in different ways by different authors, and consequently, there are very heterogeneous subsegmental motor structures that need to be evaluated. Only an adequate assessment of all motor substructures may result in a comprehensive insight into overall motor development. The significance is evident both from the aspect of treatment of deficient or impaired motor functions, as well as from the aspect of determination of a child's motor potentials. One more reason to use several procedures in the evaluation lies in the fact that the data which are necessary for determining a child's motor status are collected indirectly, from parents, caregivers or relatives. Moreover, some instruments are more sensitive to general developmental deviations than to delays in a certain developmental domain, while in others just the opposite. Finally, it is necessary to have a multidisciplinary approach to the issue of assessment, both in the motor domain, as well as in other developmental domains. Thus, a good basic foundation for early intervention is realized, as well as synchronized acting on identified delays or disorders, taking into account the development of a child as an indivisible whole.

CONCLUSION

A literature review showed that the presented instruments for the assessment of motor skills during childhood are widely used in research practice in recent decades. However, regardless of the frequency of their use worldwide during the observed period, none of these instruments was standardized on the population in this country. Based on the review of literature and instruments, on the theoretical considerations of their psychometric characteristics and provided possibilities of administration, as well as based on their strengths and limitations, we believe that the application of presented instruments could significantly improve both research and practical work, in the fields of assessment and evaluation of motor development during childhood.

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THE DEVELOPMENT OF VISUAL-MOTOR INTEGRATION, VISUAL PERCEPTION AND MOTOR COORDINATION IN DEAF AND HARD OF HEARING CHILDREN[a]

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SUMMARY

The development of visual-motor integration starts at an early age through the coordination of visual and motor system. With age, as child acquires and develops certain skills, the integration of these systems changes, too. Examining the effect of age on development of visual perception, motor coordination and visual-motor integrationin deaf and hard of hearing children is the aim of this research.The sample covers 40 deaf and hard of hearing children belonging to both sexes (22 boys, or 55%, and 18 girls, or 45%). The respondents, aged from 4 to 7, were divided into three groups. Respondents in the first group were aged 4y – 4y11m (13 or 32.5%), in the second 5y – 5y11m (18 or 45%) and in the third 6y – 6y11m (19 or 22.5%). All the children were with average intellectual capacities, without additional sensory and motor disturbances and disorders and included in the program of early audiologic rehabilitation.

In the research we used the Beery-Buktenica Developmental Test of Visual-Motor Integration, the Test of Visual Perception and the Test of Motor Coordination, and in interpretation of the results we used standard scores.

The greatest average number of points was achieved in the Test of Visual Perception (97.23), then in the Test of Motor Coordination (90.90) and in the last place was the Test of Visual-Motor Integration (85.93). Student achievements in all the three tests grow as they are older, but only in the Test of Visual Perception that difference is statistically relevant (F=25.316; p=0.001).

The results of the research confirmed the influence of the age on the development of visual perception, but not on the development of motor coordination and visual-motor integration, which indicates the existence of a specificity in the development of these skills in deaf and hard of hearing children. The development of these skills should be monitored in order to timely detect a possible interference that can in a later age affect the performance in academic and social skills.

Key words: deaf and hard of hearing children, visual perception, motor coordination, visual-motor integration

INTRODUCTION

Visual-motor integration

Beery (2010:13) defines visual-motor integration as a degree at which visual perception and finger-hand movements coordinated well. Visual-motor integration is

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an ability, needed for many tasks, like writing, copying, paper and pencil tasks, copying from a board and drawing. The research results show the strong relation between visual-motor integration and reading, mathematics abilities and academic achievement (Goldstein & Britt, 1994; Maeland, 1992; Sortor & Taylor, 2003; Taylor, 1999).

Visual-motor integration of fine motor abilities included:

- motor processing, including eye movements, head movements and hand movements,
- sensory processing, including visual, vestibular and somatosensory system,
- sensory perception and action, and
- high level of processing for adaptive and anticipatory aspects of fine motor functions (Shumway-Cook & Woollacott, 2001).

The development of visual-motor integration begins at an early age through cooperation of visual and motor systems. According to the age, when child gets and develops different abilities, the interaction of these two systems changes. Age, complexity and the familiarity with tasks, as well as the practice of task performance are the main factors which change and adapt the role of the visual system in the performance of motor tasks (Shumway-Cook & Woollacott, 2001).

Research results show that deaf and hard of hearing children have lower scores on visual-motor tests compared with tipically developing children (Lotz, Kroese, Puffer & Osberger, 1986) as well as that early deafness is connected with the atypical development of visual-motor skills such as copying/drawing figures and catching (Erden, Otman & Tunay, 1992; Savelsbergh, Netelenbos & Whiting, 1991).

Visual-motor function deficits are manifested while performing activities that require hand movements under the visual control. Some children who have problems in visual-motor functioning, may have difficulties in performing graphomotor activities: poor handwriting skills, untidiness, difficulties in the spatial organization of writing (Krstić, Dukić & Kovačević, 2010).

Visual perception

Visual perception is a complex activity which includes receiving visual stimuli and the interpretation of visual stimuli. It begins to develop in early months, and the most of babies after the forth month of age can follow the moving object under the certain angle. Visual perception is the actuator of the development of main motor functions in the first year of life. The development of visual attention has primary importance for the children with hearing impairment. When parents frequently use visual communication in interaction with their child, they have positive influence on the development of visual function (Spenser, 2000).

Deaf and hard of hearing children get most information through the visual channel, so, the most important thing is to determine the extent in which they correctly perceive and interpret visual information. Visual perception is not just about how much people see clearly or about the state of their eyesight, but how the brain understands and uses visual information (Marschark, 2003). In the adult deaf, who communicate using the sign language, it has been found that they exhibit better performance in certain visual tasks (rapidly shifting attention, visual detection of motion and sign language) than the deaf adults and hearing people who use the proper spoken language. In children, these benefits were not found (Marschark, 2003). The visual attention of deaf and hard of hearing students has been examined by a number of researchers and the results were not consistent. Some of them say that the children with hearing impairment have a deficit of visual perception, while the others found that there are no differences. Smith, Quittner, Osberger, and Miyamoto (1998) and Quittner, Leibach & Marciel (2004) found the difficulties in visual selection. Radoman (1996) reports that hearing loss can affect certain aspects of visual perception, such as: the speed of perception, the distinction of the shape of the object if they are similar or if they are in an unusual position. On the other side, the same author reports that the visual perception of the deaf and hard of hearing is full of details and that they notice physiognomy, gestures, facial expressions, body position and color better than others.

Fine motor coordination

Fine motor coordination develops in consistent and predictable patterns, beginning in early months and continuing until the middle of primary school (Exner, 2001). Children start to use they fingers and hands to explore the world around them in more complex ways and during the preschool period become more familiar with using typical “school” materials, such as pencils, crayons, scissors, glue etc. On the one hand, several studies show that deaf children achieve lower results in motor coordination, balance, visual-motor skills, but also in reaction time and movement speed (Karić & Radovanović, 1999; Savelsbergh, Netelenbos & Whiting, 1991; Siegel, Marchetti & Tecklin, 1991). On the other hand, several studies have found no differences in motor coordination between deaf and typically developing children (Horn et al., 2007), and these differences are associated more with the environmental factors such as the type of schooling, parental engagement and stimulation and supportive environment (Lieberman, Volding & Winnick, 2004).

The connection between motor and cognitive development is very complex. It starts in early childhood and continues into the early adulthood (Diamond, 2000). Some aspects of cognitive performance, including executive functions, are developed from the age of five to ten, while during the same period a rapid progress of motor functions is recorded, including visual-motor coordination (Ferrel-Chapus, Hay, Olivier, Bard & Fleury, 2002). In spite of mentioned correlation, just a few studies confirm that, but researchers confirm the role of attention in motor skills (Baron, 2004; Lezak, Howieson & Loring, 2004). In spite of the relationship between cognitive and motor functions described by researchers, there are only few experimental studies which has confirmed this connection. Researchers agree that cognitive and motor functions are affected by attention (Baron, 2004; Lezak, Howieson & Loring, 2004).

OBJECTIVE

The objectives of this research are to investigate the influence of age on the development of visual-motor integration, visual perception and fine motor coordination. Besides, we investigated factors affecting visual-motor integration, visual perception and motor coordination development (sex, the degree of hearing loss, amplification model, communication mode and parental educational level).

MATERIALS AND METHODS

Sample

The study sample consisted of 40 prelingual deaf and hard of hearing children with audiologic treatment on Department of Audiology, ORL and MFH Clinic, Clinical Center of Serbia. According to the age, the sample was divided into three groups, the first from the age of 4y- 4y11m, 13 children (32.5%), the second from the age of 5y-5y11m, 18 children (45%), and the third from the age of 6y- 6y11m, 9 children (22.5%). The sex structure of the sample consisted of 22 (55%) boys and 18 (45%) girls. According to the degree of hearing loss, the sample was divided into two groups: the first – mild to moderate hearing loss, 22 children (55%), and the second – severe and profound hearing loss, 18 children (45%). The results of the Chi-square test showed there were no significant differences between groups, for age ($\chi2=3.050$, $p=0.218$), for sex ($\chi2=0.400$, $p=0.527$) and for the degree of hearing loss ($\chi2=0.400$, $p=0.527$). According to the amplification model, the sample consisted of 17 (42.5%) children with cochlear implants, 7 (17.5%) children with one hearing aid, 7 (17.5%) children with bimodal amplification and 9 (22.5%) children with two hearing aids. According to the model of communication, the sample consisted of 29 (72.5%) children being able to communicate in oral form and 11 (27.5%) children who use sign language to communicate with their environment. The results of the Chi-square test showed there was a significant difference in respect to the model of communication ($\chi2=8{,}100$, $p=0{,}004$). According to the parental educational level, it has been shown that fathers (31, 77.5%) and mothers (24, 60%) frequently have middle school degree, in comparision with 9 (22.5%) fathers and 16 (40%) mothers who have high school degree. The children with intellectual disabilities or additional sensory or motor impairments were not included in this sample. All the children were enrolled in early rehabilitation programs focused on language, speech and auditory development.

Research Techniques and Instruments

In this research the battery of tests were used to collect necessary information: 1. *Visual-Motor Functioning Test*; 2. *Visual Perception Test*; 3. *Motor Coordination Test* – VMI 6th Edition, Beery & Beery, 2010.

The short form of the Beery Visual Integration Test is designed for use with most children aged 2 to 7, which presents combined tasks from the Visual Perception Test and the Motor Coordination Test. It contains 15 figures, including the initial three that are both imitated and copied directly, and three types of marking or scribbling, for a total of 21 scored items. In this test, geometric shapes are arranged in a developmental order, from the simplest to the most difficult shape in order to evaluate the visual-motor integrity.

The Visual Perception Test covers visual perception skills such as: visual discrimination, matching, classification, figure-ground differentiation, spatial relationship and visual memory. It contains 30 shapes and one point is awarded for each correct items are scored or the 3 minute time limit expires, whichever comes first. A maximum of 30 points can be earned.

The Motor Coordination test (the Fine Motor Coordination Test) covers motor skills including hand-eye coordination and it contains 30 shapes. The child is asked to copy the shape on the test booklet in the given order and the test is ended when the child fails to copy three shapes consecutively. A maximum of 30 points can be earned.

The testing was administered individually at a silent and independent room in the surrounding familiar to the children in the Department of Audiology. The test was evaluated according to the evaluation orders given in the manual (Beery, & Beery, 2010). The visual-motor integration, visual perception and motor coordination test scores were acquired for each child.

Data analysis

Frequencies, central tendency, standard deviation measures of variability and parametric tests, t-test and ANOVA test and nonparametric Chi-squred test were used for the analysis of the obtained results. The relationships between the Beery VMI, Visual Perception, Fine Motor Coordination test and parental educational level were calculated by using the Pearson correlation coefficient. In order to gain a better understanding of the development of visual-motor integration and assessing relative visual and motor contributions to the Beery VMI performance, we performed a regression analysis.

RESULTS AND DISCUSSION

Table 1 shows the achievement on visual-motor integration, visual perception and fine motor coordination tests.

Table 1 *Children Performance in Relation to Age*

Test	Visual-motor integration				
Age	N	M	SD	F	p
4y– 4y11m	13	81.38	12.90		
5y – 5y11m	18	86.94	11.29	1.577	0.220
6y – 6y11m	9	90.44	13.00		
Test	Visual perception				
Age	N	M	SD	F	p
4y – 4y11m	13	85.69	7.05		
5y – 5y11m	18	99.2	9.26	25.316	0.001
6y – 6y11m	9	109.89	6.27		
Test	Fine motor coordination				
Age	N	M	SD	F	p
4y – 4y11m	13	87	11.56		
5y – 5y11m	18	92.11	8.85	1.421	0.254
6y – 6y11m	9	94.11	12.18		

The results of our research show that the level of visual-motor integration, visual perception and fine motor coordination increased with increasing age of children, children under the age of 6y to 6y11m had the highest test scores. As they advance in age, children show the progress in sensorimotor development, as the test results in Table 1 show. A statistically significant difference in achievement on the test occurs only on the Visual Perception Test (F=25.316; p=0.001). The post-hoc test showed statistically significant differences for each age group.

Kutz, Wright, Krull & Manolidis (2003) used Mullen Scales of Early Learning to assess language, motor and perceptual abilities between 18 children with profound hearing loss, cochlear implants candidates. They found that there was the negative correlation between age and test scores. The negative relationship between age and fine motor development was found among 22 prelingual deaf babies and children (Horn, Pisoni & Miyamoto, 2006). In conclusion, authors highlight the relationship between motor and language development, and a fact that auditory deprivation may lead to the atypical development of certain motor and language skills, that share common cortical processes. The results of a research carried out on a sample of 104 typically developed children show that there are no significant differences in visual-motor functions skills in respect to the age (Krstić, Dukić & Kovačević, 2010). Other studies show the opposite results and researches have consistently identified significant correlations between age and visual-motor skills. Thus, the study carried out among largest sample, aged 6y – 14y11m, found mentioned correlations and the greatest progress was found in those aged eight to fifteen. The period of two months was found to be the key period for achievement in eight-year-old children, whereas in children over eight, significant difference was noticed in period of two years (Tekok-Kiliç et al., 2010). In a study which was carried out among 276 tipically developed children comparisons were made for all of the four age groups and each showed statistically significant differences on visual-motor and fine motor coordination tests (Memišević & Hadžić, 2013).

Kephart (Kephart, 1960, according to Beery & Beery, 2010) noted that children could have well-developed visual and motor skills but be unable to integrate the two. We were interested in the intercorrelation between visual, motor and visual-motor test performance, and the results are shown in Table 2:

Table 2 *Intercorrelation of applied tests*

	Visual perception/ Fine motor coordination	Visual perception/ Visual-motor integration	Fine motor coordination/ Visual-motor integration
R	0.119	0.365	0.355
P	0.463	0.021	0.025

The low correlation has been found between the Visual Perception Test and the Visual-Motor Integration Test, and between the Visual-Motor Integration and Fine Motor Coordination tests. Beery & Beery (2010) noted that visual-motor integration is not the sum of visual perception and motor coordination, the visual-motor integration can be greater than the sum of its parts and the parts can independently function well but not in combination. The same authors noted that it is important to know that the development of visual-motor integration may not always be smooth; in some cases progress is sharp and may even involve temporary regressions.

The result of regression analysis showed that visual perception and fine motor coordination explained 23 percent of the variance in visual-motor integration (Table 3).

Table 3 *Regression Analysis Summary for Visual Perception and Fine Motor Coordination Predicting Visual-Motor Integration*

	B	B	t	p
Visual perception	0.338	0.327	2.254	0.030
Fine motor coordination	0.367	0.316	2.175	0.036

Futhermore, we were interested in test scores below the average range (< 1 SD to <2 – borderline and < 2 SD – impairment), and the results are shown in Table 4:

Table 4 *Children's scores lower than the average*

	Visual perception		Fine motor coordination		Visual-motor integration	
	F	%	f	%	f	%
1 SD, < 1 SD	6	15.0	8	20.0	9	22.5
2 SD, < 2 SD	/	/	2	5.0	6	15.0

The deviating of 2 SD or more than 2 SD has been found in six children on the Visual-Motor Integration Test and in two children on the Fine Motor Coordination Test. The deviating of two standard deviations indicates the existence of hindrances in these areas. The obtained results clearly indicate that these children should be included in the programmes for the stimulation of the development of visual-motor integration.

Table 5 shows test scores in relation to sex:

Table 5 *Test scores in relation to sex*

Test	Visual-motor integration				
Sex	N	AS	SD	T	P
Male	22	84.59	11.95	0.748	0.459
Female	18	87.56	13.06		
Test	Visual perception				
Sex	N	AS	SD	T	P
Male	22	97	11.82	0.129	0.898
Female	18	97.5	12.55		
Test	Fine motor coordination				
Sex	N	AS	SD	T	P
Male	22	91.91	9.73	0.656	0.516
Female	18	89.67	11.89		

Considering that girls spend more time in drawing than boys and that there are other sex differences in maturation during childhood, we expected to find differences on test scores. However, average scores of girls and boys were about the same. The results indicate there were no significant differences on any of the three tests. Our findings are similar to the other studies which have been carried out on a sample of preschool or lower school children where significant difference in visual-motor integration between boys and girls have not been founded (Coetzee &Du Plessis, 2013; Tekok-Kiliç, Elmastaş-Dīkeç & Can, 2010).

Table 6 shows the results in relation to the degree of hearing loss:

Test	Visual-motor integration				
Hearing loss	N	AS	SD	T	P
Mild to moderate	22	87.18	13.31	0.704	0.485
Severe to profound	18	84.39	11.36		
Test	Visual perception				
Hearing loss	N	AS	SD	T	P
Mild to moderate	22	96.82	13.74	-0.234	0.816
Severe to profound	18	97.72	9.83		
Test	Fine motor coordination				
Hearing loss	N	AS	SD	T	P
Mild to moderate	22	92.18	11.53	0.836	0.408
Severe to profound	18	89.33	9.62		

The variance analysis has showed that there are no statistically significant differences in achievement on tests in relation to the degree of hearing loss. Research results (Gkouvatzi, Mantis & Kambas, 2010) have showed that there are no significant differences in visual-motor integration between deaf and hard of hearing students. By consulting literature, we can conclude that researchers' focus is not directed to examining influences of the degree of hearing loss on the quality of visual-motor integration, but to the comparison with typically developing children (Dodd, Woodhouse & McIntosh, 1992; Horn et al., 2007; Lotz et al., 1986; Spencer & Delk, 1989).

The researchers were interested in influence of the cochlear implant to the quality of visual-motor integration rather than the influence of the degree of hearing loss.

Table 7 shows the results of students in relation to the model of amplification:

Table 7 *Test scores in relation to model amplification*

Test	Visual-motor integration				
Model of amplification	N	AS	SD	F	p
Cochlear implant	17	87.47	14.91	0.401	0.753
Hearing aid	7	87.14	10.90		
Cochlear implant and hearing aid	7	81.43	11.35		
Two hearing aids	9	85.56	9.69		
Test	Visual perception				
Model of amplification	N	AS	SD	F	p
Cochlear implant	17	94.12	14.26	1.552	0.218
Hearing aid	7	102.43	7.91		
Cochlear implant and hearing aid	7	93.57	8.63		
Two hearing aids	9	101.89	10.565		
Test	Fine motor coordination				
Model of amplification	N	AS	SD	F	p
Cochlear implant	17	93.18	11.48	0.497	0.686
Hearing aid	7	87.71	11.61		
Cochlear implant and hearing aid	7	90.14	8.45		
Two hearing aids	9	89.67	10.71		

Our study did not find evidence supporting an association of the model of amplification with test scores concerning visual-motor integration, fine motor coordination and visual perception. The children with cochlear implant showed greater performance only on the fine motor coordination test, compared to the children with other models of amplification. Tiber (1985) investigated visual-motor integration skills of prelingually deaf children from 2.5 to 17 years of age, six months before implantation, and six months after implantation. He found out that prelingually deaf children were lagging behind their hearing peers for 1.5 years, but after implantation he noticed a rapid progress. A study (Schlumberger, Narbona & Manrique, 2004) among the sample that consisted of three different populations from 7 to 9 years of age, they being normal hearing children, the profoundly deaf with the cochlear implant and the profoundly deaf children with hearing aids, found out that all the three groups performed similarly on simple motor tasks across all ages. However, the profoundly deaf children with cochlear implant or hearing aids reported lower levels on complex motor tasks compared to their normal hearing peers. The results of these studies indicate that children who received a cochlear implant at an earlier age tended to have higher visual-motor integration scores. The authors (Horn et al., 2007) found a strong relationship between visual-motor and language skills in deaf children before and after implantation, and based on those findings, they concluded that figure copying tasks can be used clinically to predict benefit from cochlear implantation.

Table 8 shows test scores in relation to a mode of communication (spoken or signed language):

Table 8 *Test scores in relation to a mode of communication*

Test	Visual-motor integration				
Mode of comm.	N	AS	SD	t	p
Spoken language	29	86.17	12.818	0.202	0.841
Signed language	11	85.27	11.765		
Test	Visual perception				
Mode of comm.	N	AS	SD	t	p
Spoken language	29	97.21	12.932	0.015	0.988
Signed language	11	97.27	9.655		
Test	Fine motor coordination				
Mode of comm.	N	AS	SD	t	p
Spoken language	29	90.52	11.513	0.718	0.302
Signed language	11	91.91	8.467		

Both groups of children achieved similar average test scores, whether they used spoken language or sign language. In a study (Hauser, Cohen, Dye & Bavelier, 2005) that examined visual-motor and visual constructive skills by comparing the performance of deaf native singers to that of hearing non-singers (average age 20 years), the researchers did not find a significant difference between these two groups. The results of longitudinal researchs showed that perceptual-motor development is closely related to the early preparation for language development and to speech and language development at a later age, as reported by Locke et al. (Locke, Bekken, McMinn-Larson & Wein, 1995). In addition, the results could be brought in connection with the model of communication, because some studies have proven that there is a high correlation between reading and writing skills, as well as between academic achievement and achievement on tests of figures copying, in deaf and hard of hearing children who use sign language (Hauser et al., 2007).

To determine the correlation between test scores and parental educational level we used Perason correlation, and the results are shown in Table 9:

Table 9 *The correlation between test scores and parents' educational level*

	Test					
Parental educational level	Visual-motor integration		Fine motor coordination		Visual perception	
	r	p	r	p	r	p
Father	0.365	0.021	0.232	0.149	0.232	0.149
Mother	0.009	0.955	0.002	0.991	0.105	0.519

The only statistically significant correlation was found between fathers' educational level and visual-motor test scores (r=0.365; p=0.021), where correlation coefficient of 0.3 is considered as low positive correlation. One earlier study has found no significant correlation between three outcome measures and parental educational level (Goyen, Lui & Woods, 1998). In a study (Ercan, 2011) which examined visual-motor integration skills, visual perception skills and fine motor coordination skills of tipically developed 60- to 72-month-old children in relation to low and high socioecomic status, no statistically significant differences were found. Numerous researchers have found high correlations between academic abilities and visual-motor integration in children, as well as the high correlation between academic achievement and parental educational level, so we expected to find mentioned correlations. The children in our study were pre-school children and their parents had not been fully involved in their activities yet, and this could be a possible reason why we did not find expected correlations.

CONCLUSION

As they advance in age, children show the progress in visual-motor integration, visual perception and fine motor coordination, as the test results show. But, we did not find any significant difference between the three age groups. Given these results, we would be inclined to say there are specificies in visual-motor development between deaf and hard of hearing children, but for generalization a larger sample would be needed and a control group of typically developing children.

Our sample consisted of children who began audiologic and speech-language rehabilitation immediately after the diagnosis of hearing impairment. No statistically significant differences between the children with different levels of hearing loss confirm the efficacy of an early rehabilitation and its role in detecting, preventing and overcoming delays in visual-motor integration performance. The high values of standard deviations in all three tests indicate the high individual differences, as well as the importance of individualized rehabilitation training programs for all deaf and hard of hearing children, especially in the preschool period.

The consideration of environmental factors which can affect the examined skills presents another limitation of our study (we only examined the influence of parental educational level). Environmental factors, first of all stimulating environment, have a beneficial effect on visual-motor integration (Oliver, 1990; Dankert, Davies & Gavin, 2003), which we suggest for further research.

Usually the visual-motor disabilities are not recognized until starting school. The problems with writing, drawing/colouring and use of school materials may be the first signs that there is a problem. There is a lot of activities to improve visual-motor integration skills: drawing on small or large areas, colouring, paper-cutting, stacking blocks and practicing everyday activities such as buttoning, tying shoelaces, folding clothes etc. Besides activities mentioned above, many educational computer games have been designed to improve visual perception and visual-motor integration (Radovanović, Radić-Šestić, Karić & Milanović-Dobrota, 2013).

The research results confirm the importance of visual-motor integration in the development of skills such as tracing, writing, handwriting, reading, math skills, and overall academic achievement in studies that included a sample of children with typical development (Maeland, 1992; Goldstein, Britt, 1994; Taylor, 1999; Sortor et al., 2003) and children with disabilities (Feagan, Merriwether, 1990; Maeland, 1992). Moreover, the research results confirmed that visual-motor integration is a good predictor of academic achievement and that might be the promising area for future research among deaf and hard of hearing preschoolers.

The research in the assessment of visual-motor integration, visual perception and motor coordination has practical and empirical applications, since the identification of problems in these areas is important to prevent or minimize risks in other areas, to recognize the causal factors and to find a good strategies for overcoming the difficulties.

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NEURODEVELOPMENTAL OUTCOMES IN PREMATURELY BORN CHILDREN

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SUMMARY

Introduction: Premature birth is an important risk factor which affects the occurrence of neurodevelopmental difficulties. Premature infants are born before the 37th week of gestation and, concerning their organ and functional structures, they are still unready for environmental conditions. Hence, they are likely to exhibit certain delays, in comparison to the full-term infants. Because of those reasons, it is important to follow the development of these infants and to include them in the early intervention programs.

Goal: The goal of this research is to examine how parents assess the development of their infants and to see whether there is a difference in neurodevelopmental outcomes between full-term infants and premature infants.

Materials and methods: The cross-sectional study included 61 children between 15 months and 4 years of age. As an instrument, the Child Development Inventory was used, which is a questionnaire designed for parents with the aim of assessing the behaviour and abilities of their children.

Results: The obtained results indicate that the complications at birth occur more often with premature infants, as well as that the difficulties are manifested in more than two developmental areas. On the General Development Scale, there is a significant difference ($x^2=4.11$; $p=0.04$) between the two observed groups.

Conclusion: If the problems in a child's early development are detected on time, the way towards efficient early intervention is paved. One of the ways for actions to be as effective as possible is the application of screening instruments by which valid information from parents is obtained.

Key words: preterm infant; neurodevelopmental outcomes; Child Development Inventory

INTRODUCTION

Year after year, the number of infants who come to this world with the risk of the occurrence of a certain form of delay in their development increases (Doig, Macias, Saylor, Craver & Ingram, 1999). A significant improvement in the sphere of neonatal care over the last few decades caused the risky infant survival rates to increase. However, the risk of neurodevelopmental delays, cerebral palsy, cognitive difficulties, as well as the behaviour problems also increased (Arnaud et al., 2007). Neurodevelopmental delays and impaired development are very common pediatric problems, which are found in 5-10% of children (Benzies, Magill-Evans, Hayden & Ballantyne, 2013).

According to the World Health Organization (2000), a prematurely born infant is an infant born after 28 and before 37 completed weeks of gestation, counting form the first day of the last menstruation (Ljutić, 2013). Organ systems of premature infants are not completely developed and as such they cannot make it possible for the baby to function adequately immediately after birth. As a result, there are numerous complications (Bhutta, Cleves, Casey, Cradock & Anand 2002). The consequences of premature birth are numerous; they are directly connected with the gestational age at birth, but also with the infants' weight (Solt & Redshaw, 2006). Research papers indicate that premature children have lower intellectual abilities in contrast to full-term children, around 10.9 units on average (Bhutta et al., 2002). Also, they more often encounter difficulties when mastering academic skills; they also have problems with memory, executive functions, perception, gross and fine motor, orientation in space, etc. (Salt & Redshaw 2006). When compared to the full-term children, premature ones more often have cerebral palsy, mental retardation, hearing loss (Moster, Terje & Markestad, 2008), but also visual impairment (Baron et al., 2009). These children also have a higher risk of occurrence of neurodevelopmental delays, cognitive and language difficulties (Pietz et al., 2004), hyperkinetic disorder, problems with behaviour and emotions (Monster et al., 2008), as well as learning problems (Huddy, Johnson & Hope, 2002).

The population study based on premature infants born between 1991 and 1992 indicates that there is a significant deficit in executive functions with these children, when compared to full-term children. The greatest difficulties were noted with initiating activities, creating new ideas and strategies, long-term memory, planning and the organisation of thoughts and information (Anderson & Doyle, 2004). Also, the studies have shown that language delays are more present in preterm children (Ohl, Dornier, Czajka, Chobaut & Tavernier, 2009), while the children born extremely prematurely are very prone to developing eye abnormalities and impairment of visual functions (Smith 2004). There is also a significant disorder rate in behaviour and attention, which was reported by the parents and kindergarten teachers (Solt & Redshaw, 2006). Research conducted with the aim of comparing male and female children indicate that boys are more often born prematurely. They weigh more than the girls at birth – however, the mortality rate is also higher, as well as the rate of postnatal complications, and they also have a lower Apgar score. Throughout longitudinal studies, it has been confirmed that boys generally have worse neurodevelopmental outcomes in all the areas, in comparison to girls (Peacock, Marston, Marlow, Calvert & Greenough, 2012).

The assessment and the follow-up of a child's development at the very early age is a necessary precondition for starting with timely early intervention procedures and achieving as good results as possible. Health professionals employed in services for primary healthcare and development encounter challenges when choosing economical, but also precise methods for screening children with neurodevelopmental delays (Benzies et al., 2013). With early detection of children with a higher risk of complications, there is a possibility for timely early intervention and support for the family, but also for the follow-up of child's development. The use of parents' reports is becoming more popular, being the method which increases the economic gain of screening. Authors such as Henderson and Maisels (1994) state that combining parents' reports on children's development with the instruments used for screening significantly increases the accuracy of assessment (Montgomery, 1999). One of the questionnaires which is based upon the parents' reports is the Child Development Inventory. Ireton, the author of this questionnaire, points out that developmental assessment of a little child must include the information given by the child's parents. He also says that parents' observations and their concerns may provide us with key information about the development and the needs of a child (Ireton, 1992).

GOAL

The goal of this research is to examine how parents assess the development of their child and to see whether there is a difference in neurodevelopmental outcomes between full-term children and premature children.

MATERIALS AND METHODS

For the needs of this research, the "Child Development Inventory" (CDI) questionnaire was used. This questionnaire is the revision of the "Minnesota Child Development Inventory" from 1972. The revised version is easier to fill in; it contains a more comprehensive set of items in terms of age coverage, but also the additional statements which measure parents' concern about child's vision and hearing, health and growth as well as development in general (Ireton, 1992).

Child Development Inventory is questionnaire was based on the fact that the parent provides information on the development of their child. The Child Development Inventory consists of a booklet and answer sheet for the parent to complete and a Child Development Inventory Profile sheet for recording results. The booklet contains 270 statements that describe the behaviors of children in the first six and onehalf years of life. These items describe developmental skills of young children that are observable by parents in everyday situations. These items were found, through research, to differentiate older children from younger children. In the CDI booklet, the items are grouped by scale. Items in each scale are in random age order. In the instructions the parent is asked to indicate those statements which describe the child's behavior by marking YES or NO on an answer sheet. Scoring is done by simply counting the number of YES responses for each of the scales using a single scoring template. The scores for the scales are then recorded on the Child Development Inventory Profile sheet. The profile pictures the child's development in comparison to norms for children age one to six years. The age norms of the profile are based upon a sample of 568 children one to six years-three months old. The booklet also includes 30 problems items that describe various symptoms and behavior problems of young children. The CDI measures development in eight areas: social, self help, gross motor, fine motor, expressive language, language comprehension, letters, and numbers. It also includes a General Development Scale, a summary scale that provides an overall index of development.

For the needs of this research, a shortened version of this questionnaire was used, where the number of questions per scales was reduced, in order to adapt them to the age of the children, that is 4 years. The numbers and letters scales were eliminated for the same reason. Based on the child's age, in Child Development Inventory Profile one draws a line of the expected range of success, and then in relation to that line, one also draws the lines which mark results worse by 25% (-1.5 SD) and 30% (-2 SD). The child's result is compared with the expected by drawing the points of success for each scale of the questionnaire. If a child's result on a certain scale falls below the line which marks -2SD, we say that there is a developmental delay in that area.

Sample: The cross-sectional study included 61 children, 35 of which (57.4%) were full-term, and 26 (42.6%) were premature children. The age of the children was from 15 months to 4 years. The research was conducted within regular visits to pediatric ambulatory clinics in the Health centre and Institute for Child and Youth Health Care in Vojvodina. Concerning the sex of the children, from the total number of full-term children, there were 20 boys (57.1%) and 15 girls (57.7%), whereas in the group of premature children, there were 15 boys (42.9%) and 11 girls (42.3%).

Procedure: Ethics commissions of institutions in which the research was conducted authorized the research. The parents were told what the purpose of the research was, the procedure was explained, and after the parents had signed the agreement, the examination was continued.

RESULTS

By applying the scale for the follow-up of child's development, we have obtained data on how parents assess the progress of their child. We first checked the reliability of the scale and the obtained Cronbach's Alpha value is 0.95, which indicates that the scale is very reliable and internally balanced for this sample. It gave us the right to continue with the further analysis of the obtained data.

At the very beginning of the questionnaire, the parents were asked to give some general information about their child and family, such as the sex of the child, the place of residence, education of the parents, the number of children in the family. Based on the statistical analysis obtained by applying the x^2 test, it has been established that there are no significant differences in the number of boys and girls in this sample (x^2 =**0.002**; p=**0.96**).

Further analysis of demographic data was done also by applying x^2 test. The obtained results show that there is a statistically significant difference between premature and full-term children concerning the place of residence (x^2 =**0.046**; p**<0.05**). The results indicate that there is a higher number of premature children in rural areas.

When speaking of the number of children in the family, there were families with one child, but there were also those with five children. Concerning the number of children in the family, there are no significant differences between the number of children in the families of premature and full-term children (x^2 =**0.1670**; p=**>0.05**).

Also, there were no statistically significant differences when it comes to the education of the parents with both groups (x^2 =**0.159**; p=**>0.05**). The above-mentioned data is shown in Table 1.

Table 1 *Review of demographic data*

		Full-term infants	Premature infants	Chi-Square	p
Sex	M	20	15	0.002	> 0.05
	Ž	15	11		
Place of residence	Countryside	25	12	0.046	<0.05
	City	10	14		
Education	1	0	1	0.159	>0.05
	2	17	13		
	3	3	6		
	4	15	6		
Number of children in the families	1	14	7	0.1670	>0.05
	2	14	15		
	3	5	2		
	4	0	2		
	5	2	0		

By analysing parents' reports on complications during pregnancy and immediately after birth, the most commonly mentioned is the respiratory distress syndrome. The respiratory distress syndrome was present in three newborns. Apart from the respiratory distress syndrome, urgent Caesarean section, preeclampsia, intraventricular hemorrhage, asphyxia, intubation of a child and sepsis were also mentioned. The listed complications and the number of children in which the complications occurred are shown in Table 2. There were also combined complications, namely, it happened that one child had more than one complication at birth. According to that, there were five premature children with two complications. Since the complications were present in twelve children, all of which were premature children, it is concluded that there is a statistically significant difference in the presence of complications in premature children and full-term children (x^2 =**20.11**; p**<0.05**).

Table 2 *Review of complications*

		Full-term infants	Premature infants	Chi-square	p
Complications:	No complications	35	14	20.11	<0.05
	Respiratory distress syndrome	0	3		
	Preeclampsia	0	2		
	Intubation	0	1		
	Urgent Caesarean section	0	2		
	Sepsis	0	1		
	Asphyxia	0	1		
	Intraventricular hemorrhage	0	2		

During the further data processing of the applied questionnaire, the results in the scope of each observed domain in both groups were analysed. Deviations in six domains are represented (-2SD). The data are shown in Chart 1.

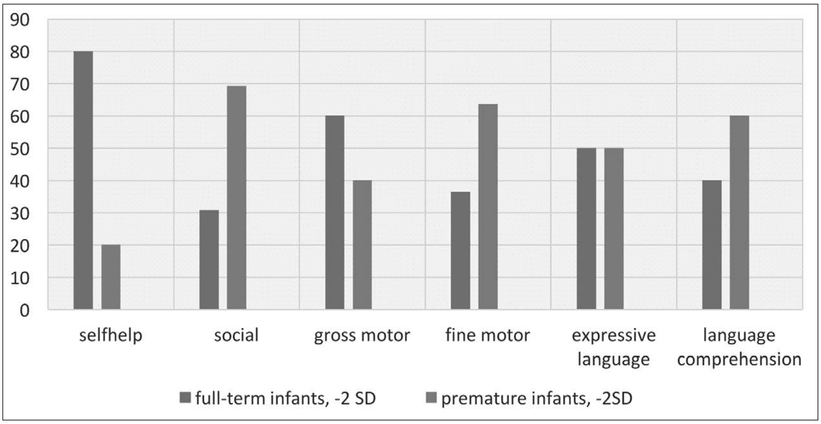

Chart 1 Distribution of children according to variations in specific domains

Each scale is analysed separately, and then only those values of –2SD which indicated neurodevelopmental delays in certain domains were taken into account. The final result is a sum of problematic developmental areas for every child and the data are shown in Table 3.

Table 3 *Review the number of children in relation to the number of domains*

Summary	Number of domains	Full-term infants	Premature infants
40 (100.0%)	No developmental problems	24 (60.0%)	16 (40.0%)
7 (100.0%)	Deviation in 1 domain	6 (85.7%)	1 (14.3%)
14 (100.0%)	Deviation in 2 or more domains	5 (35.7%)	9 (64.3%)
61		35 (57.4%)	26 (42.6%)

According to the values given in Table 3, we see that there are differences in the number of domains in which there is a developmental delay, but those differences are not statistically significant (x^2 =**5.097**; p=**>0.05**). Prematurely born children manifest a higher number of difficulties in several areas.

In order to examine the effect that time has over the child (premature or full-term) in terms of the levels of functioning in the observed areas, further data processing was carried out. Levene's test for equality of variances showed that for the observed variables of socialization, self-help, gross and fine motor, significance level is higher than 0.05 and further analysis of this variable was done by one-way factor analysis of variances. For the expressive scale, the understanding scale and the general development scale, the Kruskal-Wallis test was applied. The one-way analysis of variance (Table 4) showed that there are no statistically important differences in the observed variables in both groups.

Table 4 *Results on social scale, self-help scale, gross and fine motor scale in both groups*

		N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean	F	p
Social scale	Full-term infants	35	16.49	8.535	1.443	13.55	3.183	0.080
	Premature infants	26	20.08	6.603	1.295	17.41		
Self-help	Full-term infants	35	16.37	7.814	1.321	13.69	0.392	0.533
	Premature infants	26	17.54	6.256	1.227	15.01		
Gross motor scale	Full-term infants	35	15.31	5.865	0.991	13.30	0.318	0.575
	Premature infants	26	16.12	4.934	0.968	14.12		
Fine motor scale	Full.term infants	35	14.00	6.481	1.095	11.77	0.016	0.899
	Premature infants	26	14.19	4.825	0.946	12.24		

By applying the Kruskal-Wallis test for the three variables in which there was no homogeneity, it was shown that there is a statistically significant differences in the General Development Scale (x^2=**4.11**; p=**0.04**), whereas for other variables there was not any significant difference manifested. The General Development Scale is the most important scale of the questionnaire – it is the most important indicator of the overall child's development. It consists of 70 items, that is 10 items per these areas: socialization, self-help, gross and fine motor, expressive and receptive language, and 5 items per these two areas: letters and numbers. The chosen items refer to the kinds of behavior that are age-discriminating (Ireton 2002). Although there was no statistically significant difference, it can be observed that the mean values are higher in premature children (Table 5).

Table 5 *Results on expressive language scale, language comprehension and General development scale*

	Time of birth	N	Mean Rank	Chi-Square	P
Expressive language scale	1. full-term infants	35	28.20	2.045	0.153
	2. premature infants	26	34.77		
Language comprehension scale	1. full-term infants	35	29.17	0.873	0.350
	2. premature infants	26	33.46		
General development scale	1. full-term infants	35	27.01	4.144	0.042
	2. premature infants	26	36.37		

The purpose of the additional scale of special problems was for the parents to state which of the development-related problems occurred in their children. Six parents stated that their child is by nature more demanding than other children, five of them stressed that a child does not speak well enough for their age and that they are hyperactive.

Among the most commonly circled answers were: sleep problems, excessive irritation when separating from the parents, health problems, eating problems. The answers are not significantly connected neither with the premature children, nor with the full-term children.

DISCUSSION

The goal of this research was to determine whether there are differences in neurobehavioral development between premature and full-term children and to what extent, by using the Child Development Inventory questionnaire, which is based on the statements of parents about the behaviour of their children. We assumed that the differences existed, and the results that we obtained are the following.

In contrast to the study by Frederick Serenius and his co-workers (Serenius et al. 2013), in which it was concluded that neurodevelopmental outcomes depend on the gestation week in which the child is born, our results did not show that there is a significant difference in the functioning of children who were of different gestational age. Results that we have obtained repeat throughout different related research, such as the one conducted by Wood and Marlow, in which the scientists dealt with developmental delays in prematurely born children (Wood, Marlow, Costeloe, Gibson & Wilkinson, 2000), but also in the research conducted by Tommiska and his co-workers (Tommiska et al., 2003).

The relationship between the number of boys and girls in the sample of prematurely born children also varies from research to research, and our results show that in this sample of 26 prematurely born children there was no statistically significant difference in the number of boys and their success in comparison to girls. Contrary to this, the longitudinal study conducted by Zeitlin and his co-workers shows that boys are more often born prematurely (Zeitlin et al., 2002), and the results of the research conducted by Hintz (Hintz, Kendrick, Vohr, Kenneth Poole & Higgins, 2006) and Hindmarsh (Hindmarsh, O'Callaghan, Mohay & Rogers, 2000) show that developmental difficulties and delays occur more often with boys. The results similar to ours which indicate that the differences between boys and girls are not statistically significant, were obtained in the already-mentioned research conducted by Serenius and his co-workers (Serenius et al., 2013).

The level of the parents' education – that is of the persons who filled in the Child Development Inventory questionnaire – is mentioned as an important factor, since the researchers are often sceptical when it comes to the reliability of parents' statements, especially made by those of a lower educational level and of those of a lower socioeconomic status (Ireton, 1992). That is why we focused our attention on, among other things, the level of education of the parents. The most present level was secondary education, that is completed high school. There were no significant differences in the level of education of premature children and full-term children, in contrast to other studies (Serenius et al., 2013), where the results indicated that the parents of premature children were of lower educational level.

The area of socialization of preterm children has not been investigated deeply, but there are papers which state that preterm children have lower achievements in this area. The research conducted by Kelly Jones and co-workers indicates that children who were born prematurely exhibit a weaker control of their emotions, take part in the games with their peers more rarely and have a weaker interaction with their parents than full-term children (Jones, Champion & Woodward, 2013). Killeen and his co-workers dealt with the area of adaptive skills (conceptual, practical and social skills) in prematurely born children aged from 6 months to 5 years (Killeen, Shiel, Law, Segurando & O'Donovan, 2015). The results obtained in this research show that all the three skills in prematurely born children are less developed than in full-term children. Contrary to expectations, the results obtained in our sample indicate that in the area of socialization there are no statistically significant differences between premature and full-term children. However, if we look back at the data shown in Chart 1, we see that premature children deviated for more than 2SD more often than full-term children.

Raphaella Moreira and her co-workers point out the special sensitivity of prematurely born children in the motor areas (Moreira, Mahalhaes & Alves, 2013). Van Haastert and his co-workers conducted a study in which they dealt with the development of motor skills in prematurely born children. Different developmental paths and motor delays are the most commonly identified problems in prematurely born children during the first eighteen months of their lives (Van Haastert, de Vries, Helders & Jongmans, 2006). Achievements of prematurely born children included in our sample in the area of gross motor were not worse than those of full-term children, in contrast to other research papers that dealt with the development of gross motor skills in prematurely born children. Achievements of prematurely born children were worse in the works of Yeng (Yeng, Yau, Liao, Chen & Chen, 2000), Fallang and Hadders-Algra (Fallang & Hadders-Algra, 2005) and Volpi (Volpi, Rugolo, Peracoli & Corrente, 2010). In the gross motor area, cerebral palsy is very often connected with premature birth (Fawke, 2007). However, in our sample of 26 prematurely born children, cerebral palsy was not present in any of them. Prematurely born children, apart from delays in development of gross motor, manifest also delays in fine motor. Bos, Van Braeckel and co-workers draw attention to this (Bos, Van Braeckel, Hitzert, Tanis & Rose, 2013). Results obtained on the base of our sample show that there is no significant difference in the level of development of fine motor between premature and full term-children.

Speaking of the development of language expression, Child Development Inventory contains the scales of expressive and receptive language. Studies conducted by Guarini (Guarini et al., 2009) and Sansavini (Sansavini et al., 2010) show that the difficulties and delays in the development of language expression are more common in premature children, and they become more evident as the child grows older, in terms of bad grammar acquisition, enriching vocabulary and alike (Crunelle, Le Normand & Delfosse, 2003). However, there are research papers in which no significant differences between premature and full-term children were found. One such research is conducted by Perez-Pereire and co-workers (Perez-Pereira, Fernandez, Gomez-Taibo & Reches, 2014). Our results also show that there are no statistically significant differences in the area of expressive language. However, if we compared these two scales, prematurely born children had better achievements on the expressive language scale, whereas with full-term children it was vice versa – full-term children were better in the receptive language area.

Complications that the children included in the sample had are described in the section “Results”, and respiratory distress syndrome stood out as the most common complication. Respiratory distress syndrome was present in three premature children. In the research conducted in Montenegro (2005-2008), the obtained results showed that 53% of premature children had the respiratory distress syndrome (Banjac, Dunjić, Ristovski-Jakšić, Dragaš & Banjac, 2013). As complications which had a great impact over the premature children, Gnigler with his co-workers mention intracerebral haemorrhage and retinopathy of prematurity (Gnigler et al., 2014). In our sample which included 26 prematurely born children, none of them had the mentioned complications. There were no such complications in the group of full-term children either.

Neurodevelopmental outcomes are under the influence of numerous environmental and biological conditions, and also medical conditions (Velikos et al., 2015). The General Development Scale allowed for the representation of the development of prematurely born children in neurodevelopmental outcomes in comparison to full-term children. The differences in neurodevelopmental outcomes were pointed out. Prematurely born children manifested certain delays in comparison to full-term children, which confirmed the assumption that we started with. The results which show that developmental delays in prematurely born children exist have been obtained in the already mentioned research by Salt and co-workers, where developmental delays and difficulties in all the domains which are included into neurodevelopment were found (Salt, 2006).

CONCLUSION

In conclusion, we state that 63% of prematurely born children who were included in our sample did not have any developmental delays or had only minor delays. This information speaks in favour of the fact that prematurely born children can be completely healthy and without any developmental difficulties and delays, which has proven to be true in more than a half of prematurely born children included in our sample. When observing individual scales, the success of prematurely born children in comparison to full-term children varies, but on the General Development Scale it has been shown that prematurely born children still have worse results. General Development Scale is, as already mentioned, the scale of the greatest importance and is the best indicator of child’s overall development.

By following the risky newborns, which is the group that includes prematurely born children, timely detection of the most discreet signals which can point to potential developmental problems has become possible. That paves the way for including a child in the early intervention programs with the aim of preventing the occurrence or the deterioration of developmental difficulties and delays. One of the ways for action that would be as efficient as possible is the application of the screening instruments, by which valid data from parents on their child’s development are obtained.

This research was conducted on the sample of 61 children, which is also the limitation of the research. The small sample size led to some atypical results. Because of this, it would be best if the obtained results were checked by using a larger number of children, paying special attention to increasing the sample size of prematurely born children.

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THE SPEECH OF LARYNGECTOMIZED PATIENTS: ESOPHAGEAL SPEECH AND TRACHEOESOPHAGEAL VOCAL PROSTHESIS

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SUMMARY

Introduction: *The speech of laryngectomized patients can be rebuilt by developing the esophageal speech skills or by applying the vocal prosthesis. Practice shows that the best voice is achieved by appling the tracheoesophageal prosthesis.*

The aim *of this manuscript was to examine the acoustic and perceptive voice characteristics of patients with esophageal speech and of patients with built in tracheoesophageal prosthesis.*

Methodology: *The research is done on the sample of 48 examinees from 48 to 78 years old. In the research we used Computer laboratory of voice analysis. In data processing we used the descriptive statistics methods. The differences between the groups were determined by the t-test for large independent samples. Pirson's correlation coefficient was used to examine the correlation between two variables. To examine the effect of independent variables on dependent one, we used the Multiple linear regression.*

The results*: Patients with esophageal speech had statistically significant higher values of parameter A-Asthenia (1.21±1.13) comparing to tracheoesophageal patients (.60±.59), while the patients with tracheoesophageal vocal prosthesis had significantly higher values of MPT parameter (7.25±2.40) comparing to esophageal patients (2.82±.90), as well as significantly higher values of WPM parameter (88.75±22.80) comparing to esophageal patients (71.89±29.83).*

Conclusion*: The progress of science and technology brought the expansive development of tracheoesophageal technique. That made the speech of laryngectomized patients qualitatively better and therefore more applicable in speech rehabilitation. The results of this research have also showed this.*

Key words: voice analysis, esophageal speech, tracheoesophageal speech

INTRODUCTION

Speech is the most powerful communication instrument, it represents the integral function of whole organism and it is an expression of ones personality. The loss of speech ability is a big shock for a patient because it directly disturbs his/hers social, psychological and professional integrity (Petrović-Lazić & Kosanović, 2008).

Larynx cancer is one of the most present malignant tumors of head and neck wich causes change of normal anatomic balance of organs that are involved in the speech production process. Causes of malignant diseases are not precisely defined so far. We can speak only about predisposing factors. Former researches on causes of the origin

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of malignant diseases say that malignant illnesses occur as a result of interaction between genetic and environment factors. Epidemiological studies indicate the strong connection between smoking and precancerous conditions and larynx cancer (Nešić, 2012).

Total laringectomy is done in large larynx cancers when all the other options of partial procedures are not possible. After a total laryngectomy, tracheotomy is done. That is a surgical procedure to make an opening in the front neck part of trachea. Breathing is done through tracheostoma with temporarily or permanently build in cannula, and the loss of speech requires therapeutic procedures to establish alaryngeal voice and speech. New source of voice (neoglottis) is formed on the esophagus entry and from the structures of upper esophageal sphincter. Total laryngectomy leads to physical and functional changes which may affect emotional state and some of the basic life functions, including breathing, swallowing and communication (Attieh, Searl, Shahaltough, Wreikat & Lundy, 2008).

The main possibilities of a voice rehabilitation after total laryngectomy are: developing the skill of esophageal speech, tracheoesophageal puncture with the use of vocal prosthesis and the use of electrolarynx. It is necessary to explain the patient the alternative methods for postoperative speech because it is important that he/she knows that there are several possibilities to regain the ability to speak (Petrović-Lazić & Kulić, 2014).

After laryngectomy the patient uses new airways and new sound sources to speak. The esophageal voice is the oldest and the most natural form of alaryngeal voice. Standard for voice rehabilitation, that is the base for all other techniques, is the esophageal speech. By swallowing, injection or aspiration the air gets in the esophagus and then from the tank in esophagus it gets back in the area of pharyngoesophageal (PE) segment where creates the mucosal vibration. It is the best if the new air tank is formed in the upper part of esophagus and lower parts of hypopharynx. Sound source are vibrations of PE segment or neoglottis which is formed in area of esophageal junction.

Vibrations are created by straining the pharynx walls. In making the esophageal voice, esophagus takes part as the air tank and neoglottis, located in the upper part of esophagus that is the source of vibrations. The air located in esophagus releases with control which leads to vibrations of PE segment and sound production. Speech is then adapted by the movements of articulator (Globlek, Stajner-Katusic, Musura, Horga & Liker, 2004; Jassar, England & Stafford 1999; Liu, Wan,Wang, Wang. & Lu, 2005).

Considering that the esophageal patients use PE segment as neoglottis, vibration process of this segment is drastically different from vibrations of real vocal cords of laryngeal speakers. That difference occurs due to physiological limits in the production of esophageal speaker. PE segment vibrates with higher aperiodical grade and with more abnormallities which reduces quality and clarity of speech. That can be explained by lower volitional control over pharyngoesophageal segment of esophageal speakers (Liu & Manwa, 2009; Robbins, Fisher, Blom & Singer, 1984).

Pharyngoesophageal segment has different structure than the real vocal cords, has significantly bigger mass and it is not physiologically adjusted for the vibration process. That leads to irregular and slower movement of PE segment and makes significant differences in the acoustic parameters of voice comparing to normal and regular vibrations of vocal cords.

The main characteristics of esophageal speech are reduced tone height, decreased strength, changed voice quality (hoarse and rough voice). Esophageal speech is also characterized by shorter length of phrase articulation and longer pause periods due to lower capacity of esophagus (Attieh et al., 2008; Blom, Singer & Hamaker, 1998; Graham, 2005).

Vibrations are created by straining the pharynx walls. This kind of vibrations produce voices. Esophageal speech has lower tonality then the normal one due to lower vibrational frequency of pharyngeal walls. The advantages of this technique is that it doesn't require any prosthesis or hand moving. In esophageal speech learning it is the most important to functionally enable new air tank and neoglottis (Petrović-Lazić, Kosanović & Vasić, 2010).

When the patient is not able to manage the technique of esophageal speech it is necessary to train him/her to use some of the laryngeal prosthesis. There are different kinds of those prosthesis, they are very popular worldwide and frequently used in voice rehabilitation of laryngectomized patients. Nowadays, voice prosthesis implantation in tracheoesophageal fistula formed by direct punction is the part of modern surgical methods of rehabilitation.

In 1980 in America Blom and Singer constructed the first silicone prosthesis that was set by punction in the hole of tracheoesophageal fistula. Vocal prosthesis is actually a silicone tube with one way valvulae that is opened to esophagus. Tracheoesophageal puncture is a surgical procedure of putting the conductor between the trachea and esophagus and keeping it by silicone prosthesis. Vocal prosthesis directs the air from lungs to neopharynx, due to air pressure the voice is produced by the vibration of pharyngoesophageal mucosa.

Today, tracheoesophageal speech became one of the methods in the rehabilitation of laryngectomized patients (Tićac & al., 2009). The air from lungs is suitable for the production of voice, it gives better strength, better span, tone, better sound stability and better quality. Speech with vocal prosthesis is almost natural by tempo and fluent articulation.

Rehabilitation of speech is a complex and active process which requires engagement and teamwork of laryngectomized person and voice pathologist. The success of therapy greatly depends on their collaboration (Kraal, Manestar & Sučić, 2004; Petrović-Lazić & Kulić, 2014).

THE AIMS OF THE RESEARCH

1. To examine the acoustic and perceptive voice parameters of patients with esophageal speech and of patients with built in tracheoesophageal prosthesis.
2. To examine if there are any statistically significant differences between perceptive and acoustic voice parameters of patients with esophageal speech and of patients with built in tracheoesophageal prosthesis.

3. To examine the influence of smoking time and patient's age on acoustic and perceptive voice parameters.

RESEARCH METODOLOGY

The sample of examinees

The research was done on 48 laryngectomized patients from 48 to 78 years old (an average age: 62,64 yrs). Considering the smoking status, there were 45 smokers and 3 non-smokers. The average period of smoking time was 32,1 years. The sample was divided into two groups. In the first group there were 28 examinees (58,3%) with esophageal speech, and in the second group 20 examinees (41,7%) with built in tracheoesophageal prosthesis (Table 1).

Table 1 *Sample structure*

		N	%
Group	Esophageal patients	28	58.3
	Patients with prosthesis	20	41.7
Smoking status	Smoker	45	93.8
	Non smoker	3	6.3
Smoking time period (AS±SD)		32.1±13.15	
Age (yrs) (AS±SD)		62.64±7.81	

The procedure and data processing

Data acquisition from patients is done in several clinical centers in Belgrade. Analysis and data processing is done in The Clinical centre "Zvezdara". In this research data on age, smoking status and smoking time period were acquired in oral interview of examinees before the evaluation and testing. The evaluation of the acoustic and perceptive voice and speech characteristics was done at the end of the rehabilitation. The examination was done individually, and voice and speech recording was done in a quiet room isolated from noise. Before testing examinees got precise instructions and explanations.

In the research we used Computer laboratory of voice analysis, model 4300 of "Kay Elemetrics" Corporation with the software for multidimensional voice analysis. The Sony ECM-T150 microphone attached to the headphones was placed 5 cm away from the examinee's mouth. The signal was recorded directly to the computer. Each group repeated the long vocal »A« in a intensity and height that was the most adequate for them, for at least 5 seconds, three times, and the median produced value was taken for the analysis.

In the process of speech and voice analysis the basic elements that we followed were: variation of primary frequency (vFo), maximum phonation time of vocal "A" (MPTa), the length of the phrase measured by the number of the words produced in a minute (WPM).

Perceptive voice characteristics were analyzed by GRBAS scale. That is a standardized scale for subjective evaluation of voice quality and the most widespread voice scaling method which enables comparison and monitoring of voice. The scaling method has proven successful in the evaluation of voice quality as well as in determining the level and garvity of voice disorders. Subjective assessment of voice quality means analyzing the voice with own hearing, that is listening. Perceptive voice characteristic were evaluated by the three vocal pathologist which did the evaluation independently.

GRBAS scale is auditory-perceptual scale developed in Japan that describes the voice quality by five qualitative voice parameters (Yamaguchi, Shrivastav, Andrews & Niini, 2003). The scale assesses: a) the general grade of hoarseness *(Grade-G),* b) voice roughness or irregular glottal pulses from the breathiness component in the area of low frequency *(Roughness – R),* c) breathiness in voice came from the turbulence accrued because of the irregular glottal wave (*Breathiness* – *B*), d) voice weakness i.e. auditory impression of hypokinetic functioning or hypo function in spontaneous phonation (*Asthenia* – *A)* as well as e) voice tension i.e. auditory impression of extreme effort, strain and tension in spontaneous phonation (*Strain* – *S*) (Bonetti, 2011).

The parameters were assessed on the four level scale with the grade from 0-3 (0-normal, 1-mild, 2-moderate, 3- distinct alteration) during standard text reading.

Statistical data processing

The descriptive statistics is used for the research (arithmetic mean with the following standard deviation, as well as with minimum and maximum). The differences between groups were determined by the t-test for the independent samples. The Pearson's correlation coefficient was used to examine the correlation of two continuous variables. To examine the effects of independent variables on the dependent ones we used Multiple linear regression.

RESULTS OF THE RESEARCH

The differences in values of the acoustic and perceptive parameters are shown in the Table 2, as well as the differences in smoking time period and examinees' age and their type of verbal communication. The examinees have statistically significant differences in parameters: A (of Grbas scale), MPT (sec), and WPM (min). The average value of parameter A of Grbas scale with esophageal patients is 1,21±1,13 and in patients with the vocal prosthesis is ,60±,59. The difference is statistically significant in level of 0,05. The average value of MPT parameter with esophageal patients is 2,82±,90, while with the patients with vocal prosthesis is 7,25±2,40. The difference is statistically significant in level of 0,01. The average value of WPM (min) with esophageal patients is 71,89±29,83, while with the patients with vocal prosthesis is 88,75±22,80. The difference is statistically significant in level of 0,05.

Table 2 *Difference in measured voice parameters considering the level of verbal communication and the results of one-factor analysis of variance*

	Group	AS±SD	p
Smoking time period (yrs)	Esophageal patients	30.50±15.58	>0.05
	Patients with prosthesis	34.50±8.55	
Age (yrs)	Esophageal patients	61.78±8.11	>0.05
	Patients with prosthesis	63.85±7.39	
G	Esophageal patients	1.78±.62	>0.05
	Patients with prosthesis	1.50±.48795	
R	Esophageal patients	1.60±.62	>0.05
	Patients with prosthesis	1.45±.68	
B	Esophageal patients	1.14±1.14	>0.05
	Patients with prosthesis	.60±.94	
A	Esophageal patients	1.21±1.13	***<0.05***
	Patients with prosthesis	.60±.59	
S	Esophageal patients	1.17±1.09	>0.05
	Patients with prosthesis	.80±.95	
Fo	Esophageal patients	449.9±90.37	>0.05
	Patients with prosthesis	5815.30±25125.80	
MPT (sec)	Esophageal patients	2.82±.90	***<0.01***
	Patients with prosthesis	7.,25±2.40	
WPM (min)	Esophageal patients	71.89±29.83	***<0.05***

AS- arithmetic mean; SD- standard deviation; p – statistical signification;

In the Table 3 the Pearson's correlation coefficients are shown to determine the correlation between the examinees' age and voice parameters on subsamples with esophageal patients and patients with vocal prosthesis. Statistically significant negative correlation between MPT and age (-,404; ,033) is determined in esophageal patients. There is a positive correlation between age and G parameter (,41; ,027), and age and R parameter of Grbas scale (,396; ,037).

Table 3 *Correlation of acoustic and perceptive voice parameters and age with esophageal patients and patients with vocal prosthesis*

Parameter	Esophageal patients	Patients with prosthesis
	r (p)	r (p)
G	***.418 (.027)***	.201 (.395)
R	***.396 (.037)***	.127 (.176)
B	.143 (.468)	.056(.593)
A	.142 (.471)	.271 (.247)
S	.143 (.469)	-.034 (.885)
Fo	-.162 (.410)	-.249 (.289)
MPT (sec)	***-.404 (.033)***	-.125 (.599)
WPM (min)	-.185 (.345)	-.038 (.873)

r – Pearson's correlation coefficients; p – statistical signification

Analyzing the results we determined that the smoking time period was not correlated with any voice parameter neither with esophageal patients nor with patients with vocal prosthesis (Table 4).

Table 4 *Correlation of acoustic and perceptive voice parameters and smoking time with esophageal patients and patients with vocal prosthesis*

Parameter	Esophageal patients	Patients with prosthesis
	r (p)	r (p)
G	-.147 (.455)	-.006 (.980)
R	-.006 (.977)	.081 (.734)
B	-.176 (.369)	.134 (.575)
A	-.054 (.783)	.292 (.211)
S	-.147 (.455)	.066 (.782)
Fo	-.029 (.885)	-.264 (.260)
MPT (sec)	.046 (.816)	-.194 (.412)
WPM (min)	.107 (.588)	-.052 (.826)

r – Pearson's correlation coefficients; p – statistical signification

The influence of smoking time period and age on the measured voice parameters in esophageal patients and patients with vocal prosthesis is examined by the Multiple linear regression. On the subsample of esophageal patients the regression model, made of age and smoking time period variables, was statistically significant in the score prediction on R scale of Grbas scale (voice roughness). By this model 15% of criteria variance is explained, where only the variable "age" gives an independent effect to prediction. The influence of age on MPT scale is also determined. The regression model of age variable was statistically significant in score prediction on MPT scale. By the model 10% of criteria variance is explained (Table 5).

Table 5 *The influence of smoking time period and age on measured voice parameters*

		Esophageal patients		Patients with prosthesis	
		R^2	β (*p*)	R^2	β (*p*)
G	Smoking time period (yrs)	0.21	-.189 (.299)	0.07	-.230 (.461)
	Age (yrs)		.436 **(**.022)		.349 (.268)
R	Smoking time period (yrs)	0.15	-.044 (.812)	0.12	-.205 (.497)
	Age (yrs)		***.401 (.039)***		.447 (.150)
B	Smoking time period (yrs)	0.05	-.192 (.335)	0.02	.088 (.781)
	Age (yrs)		.161 (.416)		.071 (.824)
A	Smoking time period (yrs)	0.02	-.069 (.731)	0.09	.201 (.513)
	Age (yrs)		.149 (.461)		.142 (.641)
S	Smoking time period (yrs)	0.04	-.162 (.416)	0.10	.150 (.640)
	Age (yrs)		.158 (.428)		-.130 (.683)
Fo	Smoking time period (yrs)	0.05	-.013 (.948)	0.08	-.178 **(**.566**)**
	Age (yrs)		-.161 (.425)		-.135 **(**.661**)**
MPT	Smoking time period (yrs)	0.10	.086 (.403)	0.03	-.193 (.541)
	Age (yrs)		-.001 ***(.033)***		.170(.997)
WPM (min)	Smoking time period (yrs)		.126 (.526)	0.11	-.047 (.883)
	Age (yrs)		-.198 (.323)		-.008 (.980)

R^2- adjusted determination coefficient; β – β coefficient; *p*- statistical signification

The correlation between subjective and objective scale is examined on both samples. In esophageal patients there is no correlation between subjective and objective scale. In patients with vocal prosthesis the MPT scale has statistically significant negative correlation with G parameters of Grbas scale (hoarseness grade) and R of Grbas scale (roughness grade). Statistically significant correlation is determined between parameters G of Grbas scale (hoarseness grade) and S of Grbas scale (voice strain) and WPM variable in the group of patients with vocal prosthesis. Correlation is statistically significant in level of 0,05 (Table 6).

Table 6 *Correlation of perceptive voice parameters and voice acoustic analysis parameters time with esophageal patients and patients with vocal prosthesis*

	Esophageal patients			Patients with prosthesis		
	Fo	MPT (sec)	WPM	Fo	MPT (sec)	WPM
	r (*p*)	r (*p*)	r (*p*)	r (*p*)	r (*p*)	r (*p*)
G	-.160 (.416)	-.070 (.725)	.062 (.755)	-.229 (.332)	-.534 **(.015)**	-.448 **(.048)**
R	.056 (.777)	-.063 (.751)	.051 (.797)	-.155 (.515)	-.487 **(.030**)	-.406 (.076)
B	-.286 **(**.141)	-.189 (.336)	-.026 (.897)	-.151 (.524)	-.326 (.161)	-.400 (.080)
A	-.096 (.628)	-.250 (.199)	-.102 (.605)	-.236 (.317)	-.293 (.210)	-.228 (.334)
S	.044 (.824)	-.154 (.433)	-.010 (.961)	-.198 (.402)	-.644 (.002)	-.582 (**.007**)

r – Pearson's correlation coefficients; p – statistical signification

DISCUSSION

The results of acoustic voice analysis show that there is statistically significant difference in values of parameter A of Grbas scale (voice asthenia) with esophageal patients and patients with tracheoesophageal prosthesis. Patients with esophageal voice had statistically significant higher values of parameter A *(Asthenia)* comparing to tracheoesophageal patients, which indicates that esophageal patients have more expressed voice asthenia then tracheoesophageal patients.

The results acquired in this research showed that the average values of examined MPT parameter (maximum phonation time) had statistically significant difference in esophageal patients and patients with vocal prosthesis. The MPT value was significantly higher (7,25 sec.) in patients with vocal prosthesis than in esophageal patients (2,82 sec.), which indicates that patients with vocal prosthesis can phonate vocals for a longer time. The researches of other authors also show that tracheoesophageal patients can hold the phonation for a longer time then esophageal patients (Baggs & Pine, 1983; Kazi et al., 2009; Robbins et al., 1984; Torrejano & Guimaraes, 2009).

The average value of MPT parameter of patients with vocal prosthesis in the manuscripts of the group of authors (Singh et al., 2008) ranged in the interval of 7-12 sec, and with esophageal patients the MPT value was 1,3-,5,3 seconds (Berlin, 1965), similar to the results of our research. Researches of the group of authors (Sedory, Hamlet & Connor, 1989) showed that the value of MPT parameter with esophageal patients was from 0,71-1,59 sec., and with tracheoesophageal patients ranged from 9,20-14,54. Prolonged phonation of tracheoesophageal patients certainly enables more fluent speech, more quality prosodic characteristics therefore more intelligible speech.

The average value of WPM (min) parameter with esophageal patients was 71,89±29,83, while with patients with vocal prosthesis was 88,75±22,80. Patients with vocal prosthesis had the value of WPM parameter significantly higher than patients with esophageal speech. The obtained result shows that patients with vocal prosthesis can produce more words in one minute then esophageal patients.

The average value of WPM parameter with patients with vocal prosthesis in the manuscripts of the group of authors (Singh et al., 2008) ranged from 95-133 words per minute, similar to the results of our research. Patients that use vocal prosthesis are able to maintain phonation significantly longer (they statistically have significantly higher MPT values), produce more syllables in one breath, establish higher speed of speech with shorter pauses and speak with stronger intensity comparing to the esophageal speakers whose speech is slower and interrupted by often breaks (Robbins et al., 1984; Sedory et al., 1989, according to Baggs & Pine, 1983; Wetmore, Krueger & Wesson, 1981).

Analyzing the results we established that with esophageal patients there was statistically significant correlation of parameter MPT and age. Therefore, as the patients are older MPT parameter is lower and possibility of continuous vocal phonation decreases. As the patient is getting older maximum phonation time shortens and shows decreasing tendency. Large number of researches worldwide (D'Alatri, Bussu, Scarano, Paludetti & Marchese, 2012; Johns & Cantrell, 1981; Singh et al., 2008; Wetmore et al., 1981) also indicate the correlation between MPT parameter and age with esophageal patients.

The results show that with esophageal patients there is positive correlation between age and parameter G (,41; ,027), then age and parameter R of Grbas scale (,396; ,037). In subsample of esophageal patients the values of parameter *G (Grade) and R (Roughness)* are getting higher as the patient is getting old. So, changes in the quality of voice that refers to the level of hoarseness and roughness of voice are more expressed with esophageal patients and they are getting worse as the patient is getting old. As the patients are older the values of this parameters increase i.e. the voice quality of esophageal patients is significantly changed.

The results of our research show that there is no statistically significant correlation between the smoking time period and age and acoustic and perceptive voice parameters in patients with vocal prosthesis, which indicates that voice parameters, in this group of patients, do not alter with the change of smoking time period or age.

By Multiple linear regression we examined the influence of smoking time period and age on the acoustic and perceptive voice parameters in esophageal patients and patients with vocal prosthesis. In subsample of esophageal patients there is a statistically significant influence of age on variable R of Grbas scale (voice roughness). As the examinee is older, the voice roughness is more expressed. The influence of age on MPT scale is also determined. As the examinee is older the value of MPT parameter is getting low. This indicates that in group of esophageal patients the maximum phonation time depends on patient's age, so younger patients show better results.

On both samples we also examined the correlation between the subjective and objective scale. In patients with vocal prosthesis, the MPT scale has significantly negative correlation with parameters G of Grbas scale (hoarseness grade) and R of Grbas scale (voice roughness). Patients that show lower grade of hoarseness and roughness in voice have better results of MPT parameter, and the possibility of phonation is significantly prolonged.

The grade of hoarseness and voice roughness are less expressed and with the decreasing tendency as the MPT parameter grows. The research results of the group of authors (Finizia, Dotevall, Lundström & Lindström, 1999) show that there is statistically significant correlation between MPT parameters in objective scale and perceptive voice parameters with patients that use vocal prosthesis, similar to the results of our research. Perceptive voice evaluation in the rehabilitation process has an advantage over objective evaluation (Finizia et al., 1999). Objective analysis, in their opinion, tends as a backup and support to perceptive voice quality evaluation, and it also can be use to follow the success of the rehabilitation after total laryngectomy.

Statistically significant negative correlation is determined between parameter G of Grbas scale (hoarseness grade) and S of Grbas scale (voice strain) and WPM variable in the group of patients with vocal prosthesis. As the value of WPM parameter increases hoarseness and voice strain are less expressed and with decreasing tendency. The result of patients with vocal prosthesis shows that with lower grade of hoarseness and roughness in voice increases the possibility to pronounce higher number of words per minute. In esophageal patients there is no correlation between subjective and objective scale.

Besides, the researches of Wetmore et al., (1981) show that tracheoesophageal patients have better results comparing to esophageal patients in assessment of parameters: MPT-maximum phonation time, the number of sillables in one breath, the number of words in one expirium. Many studies (Attieh, et al., 2008; Benazzo, Bertino, Lanza, Occhini & Mira, 2001; Bilewicz, Burduk, Kopczyhiski & Wierzchowska, 2007; Moerman, Pieters, Martens, Van der Borgt & Dejonckere, 2004; Moukarbel et al., 2011; Robbins et al., 1984; Singer et al., 2013; Van Gogh et al., 2005) documented that tracheoesophageal speech is finer and has better quality from esophageal speech, based on the results of acoustic and perceptive analysis.

CONCLUSION

This research aimed to examine acoustic and perceptive voice parameters of laryngectomized patients with tracheoesophageal and esophageal speech in order to evaluate which speech has better qualities. The results of both analyses, acoustic and perceptive, showed that the speech of tracheoesophageal patients had better qualities. In accordance with our conclusion many authors point out that the tracheoesophageal speech with vocal prosthesis is a golden standard in today’s speech rehabilitation of laryngectomized patients.

Both acoustic and perceptive voice analysis are recommended for voice analysis, because their complementary relation increases accuracy in vocal dysfunction defining and enables better choice of acoustic measuring instruments which will confirm or reject, in the most accurate way, the perceptive assessment of voice disorder.

Significant life quality improvement of laryngectomized patients is obtained by a sistematic, planned and multidisciplinary rahabilitation of patient as well as his nearest.

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KINESTHETIC-TACTILE SENSITIVITY OF HAND AND SKILL OF DRAWING SHAPE STUDENTS WITH CEREBRAL PALSY

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SUMMARY

Drawing represent complex motor-gnostic skill that require a certain maturity level neuromuscular structures, and precedes the skill of writing, which is very important in the development of each child. Kinesthetic and tactile sensitivity of hand are perceptual abilities that are closely related to the act of writing, and therefore the aim of the research is showing the importance of tactile-kinesthetic sensitivity of hand during drawing geometric shapes. The research has been conducted in Belgrade, 2016., in a special elementary school "Miodrag Matić", in sample of 14 children with cerebral palsy and associated mild intellectual disability. For assessing tactile-kinesthetic sensitivity of hand was used Luria-Nebraska Neuropsychological Battery and for assessing the skills of drawing geometric shapes is used Acadia test of development abilities. The results show the presence of correlation between the kinesthetic sensitivity of the hands and skills of drawing geometric shapes, drawing a square (p=.000), cross (p=.000), diagonal lines (p=.000), triangle (p =. 000) and circuit (p=.005). Also, tactile perception is determinant of drawing skills, and the strongest correlation between the examined parameters was found between discrimination two points of contact with drawing a circle (p=.020), square (p=.000), cross (p=.001), slashes (p=.002) and the triangle (p=.001). Also, graphesthesia form is correlated with drawing a circle (p=.009), square (p=.000), cross (p=.000), slashes (p=.000) and the triangle (p=.000) and graphesthesia numbers. Stereognosis also correlated with drawing a circle (p=.003), square (p=.003), cross (p=.004), slashes (p=.003) and the triangle (p=.006). Despite the limitations of a small sample the results obtained support the theoretical assumptions about the importance of tactile-kinesthetic perception in handling a pencil.

Key words: cerebral palsy, drawing, geometric shapes, kinesthetic-tactile sensitivity of hands, perceptions

INTRODUCTION

Development of drawing skills is a very important skill that precedes the skill of writing. Drawing represents a skill in which the arm is released and preparation for the phase of writing. Even drawing the simplest of shapes and drawings, such as, for example, "Stickman" is the initial step in preparing hand for the holding a pencil and writing of complex symbols, and letters.

According Gligorović and Vučinić (2011) development of drawings usually starts at the end of the somatosensory period, phase doodling or scribble. Brković (2011) describes the stages of development of children's drawings. Phase scribbling is present at the age of 2 to 3 years, followed by a phase of a symbolic drawing, which is present at the age of 3 to 7 years. In primary school students are present phase visual realism (age 8 to 9 years) and phase realistic drawings that develops at the age of 10 years. Drawing is also used as a diagnostic tool to assess the level of intellectual development of the child. Given that the drawing used as an indicator of intellectual maturity (Watkins, Glutting & Youngstrom, 2005), represents a very important motor-gnostic ability.

Children with cerebral palsy often have difficulty in perceiving stimuli that surrounding them. Common motor and gnostic impairment, with frequent difficulty of visual, tactile and kinaesthetic perceptions, hinder the adoption of school activities, and therefore their drawing skills. Cerebral palsy as a condition with no tendency to progression, caused by damage to children's brain in development, as a result of influence prenatal, natal and postnatal factors. According Bax (1964, according to Morris, 2007: 3), cerebral palsy is a "non-progressive disorder of mobility and body posture that is caused by a defect or an injury of the immature brain," and Morris (Morris, 2007: 6) emphasizes the association of motor disorders with disorders of the senses, perception, cognition, communication, behavior, along with epileptic seizures and all kinds of bone and joint damage.

The information which is obtained during the catching and manipulation of objects are very important for the development of sensory-motor function, and grip of pencil during writing and drawing illustrates the position of the fingers during manipulation of the pencil. The manipulation of object includes a number of mechanical phase in which the object catches, moves, and brings into contact with another object and eventually released (Flanagan et al., 2006). Somatosensory system as a complex system who receives information from the skin, muscles and joints and gives us information on the signals that receive tactile and proprioceptive receptors, receptors for temperature and pain, have a very important role in organizing the activities of daily living. Kinesthetic sensitivity, according to Feder and Majnemer (2007) defined as the ability to discriminates positions of body parts, as well as the amplitude and direction of one's movements. Kinesthetic information obtained by moving the muscles, ligaments and joints of the extremities, and according to Danna and Velay (2015) provides us sensory information about movements. Tactile sensitivity represents the ability to discriminate two simultaneous tactile sensation, but is conditioned by the number of tactile receptors in the skin and the size of the representation of those parts of the cortex-sensitive zone (Radojčić, 2003). According Jablan (2002: 53) in tactile senses belong to touch, pressure and vibration. The sense of touch is generally from tactile stimulation of receptors in the skin or the tissue just below the skin. Feeling of pressure usually is caused by deformities of deeper tissue structures, and sense of vibration due to rapid repeated sensory signals. It provides us information about the shape, texture, pressure and manipulation of objects.

The results of a research conducted by Sarkar (2013) on a sample of 180 students aged 6 to 8 years, was obtained negative correlation between cognitive ability and kinesthetic perception, but this association becomes stronger in relation to the child's age. Gligorović and Vučinić (2011) examining the quality of drawings younger school children, aged 8 to 11 years, on a sample of 400 students, for assessing the skills of drawing were used Acadia test. The analysis results established that the achievements in the field of drawing are better, but not statistically significant from achievement of the tasks of tracing form. In 81.8% of subjects while drawing shapes accomplishments are expected for age. It also revealed the presence of statistic significant correlation between class that respondents attend and quality of the drawings (p≤0.000-0.001). Achievements of girls are statistic significantly better than the achievements of boys (p=0.048). According Nedović, Trgovčević, Kulić and Marinković (2012) problems in drawing and writing children with cerebral palsy can be seen as the result of motor and perceptual deficits.

RESEARCH METHODOLOGY

As objects of existing research dealing with the skills of drawing children with cerebral palsy are not oriented to obtaining knowledge about the importance and participation kinesthetic and tactile perception, the subject of this study is to assess the existence of correlation between the kinesthetic-tactile sensitivity of hands and skills of drawing geometric shapes children with cerebral palsy.

The main aim of the research is to show the level of development of kinesthetic-tactile sensitivity of the hands children with cerebral palsy, as well as to show the connection between tactile-kinesthetic sensitivity hand with the ability of drawing geometric shapes.

Based on the defined object and aim of the research, are defined the following hypothesis: (1) It is assumed that kinesthetic perception is an important determinant of the skills of drawing geometric shapes children with cerebral palsy; (2) It is assumed that tactile perception is an important determinant of the skills of drawing geometric shapes children with cerebral palsy.

In the study are used the following instruments:

1. Drawing geometric shapes were tested using the ACADIA test of developmental abilities (Atkinson, Jonston & Lindsay, 1972), subtest 4. This subtest contains 20 items and is designed for children of regular population, so a majority of the tasks is complex for children with cerebral palsy. Because, in this study we used only the first five forms, in order of complexity. Students were asked to draw a circle, square, cross, diagonal lines and triangle. Given that the original criteria are inappropriate for children with cerebral palsy, has been modified the scoring methods used by Rapaić, Nikolić and Nedović (1995). For each task it is possible to achieve 6 points. With 0 points are estimated when is absence of geometric shapes, to a maximum of 5 points, when the drawn shape completely accurate in relation to a given geometric shape. In each drawing geometric shapes student are allowed three attempts, and it is estimated that the most successful drawing.
2. Kinesthetic-tactile sensitivity of hands was evaluated using the Luria-Nebraska Neuropsychological Battery (Luria-Nebraska Neuropsychological Battery: Children's Revision, Golden et al., 1987). Assessment kinesthetic perception was carried out using a part of the motor subscale, or task "kinesthetic based movement," and refers to the position of imitation fingers and hands, eyes closed, on both hands. Evaluation of tactile perception was carried out using the

same battery of tests, or 16 tasks scale of tactile perception. Tasks in this scale are: tactile localization, sharp-dull discrimination, discrimination strength of touch, tactile discrimination two points, determining the direction of the contact, graphesthesia and stereognosis.

3. MACS test (Manual ability classification system, Eliasson et al., 2006) for the assessment of manual skills of children with cerebral palsy. Depending on the achievements of this test, the students were classified into four groups. Assessment of manual skills of students was carried out with the aim of equalization a fine manipulative abilities of students.

The research sample of the research included 25 children with cerebral palsy, on lavel of mild intellectual disability. Based on the achievements of the test MACS (Manual ability classification system) were singled out students who belong to the group one and two, those students who can easy or predominantly good manipulate with objects. Therefore, the research sample was formed by 14 children with cerebral palsy, with mild intellectual disability, who have educational work covered in the elementary school “Miodrag Matić”, during the second term of the academic year 2015/2016. To determine the students involved in the research was used and existing medical documentation.

RESEARCH RESULTS

As the first task of the research relates to showing the correlation of kinesthetic sensitivity hands children with cerebral palsy with the skills of drawing geometric shapes, a first starting assumption is that kinesthetic perception is an important determinant of the skills of drawing geometric shapes. The analysis of the achievements is done with Spearman’s correlation coefficient. In Table 1 and Table 2 shows the achievements on tests kinaesthetic sensitivity hands and the ability of drawing geometric shapes, in Table 3 shows the correlation between the examined parameters.

Table 1 *Student achievement on the test kinesthetic sensitivity hand*

Kinesthetic sensitivity hand	Right hand				Left hand			
	Good		Bad		Good		Bad	
	N	%	N	%	N	%	N	%
Task 1	6	42.9	8	57.1	4	28.6	10	71.4
Task 2	5	35.7	9	64.3	4	28.6	10	71.4

Table 1 shows the students’ achievements on the test kinesthetic sensitivity of hands. During the execution of the first task, the students recorded a better achievement of the right hand. 6 pupils (42.9%) achieved good results on the right hand while the left hand 4 students (28.6%). During the execution of a second task, subjects recorded worse achievements in relation to the first test, where 5 students (35%) are heard running this test on his right hand, and 4 pupils (28.6) on the left arm. Based on these results we can see that students with cerebral palsy worse achievements realized on the test kinesthetic sensitivity of hands.

Table 2 *Student achievement on the test drawing geometric shapes*

Achievements	Achievements at Acadia test									
	Drawing a circle		Drawing squares		Drawing cross		Drawing diagonal lines		Drawing triangle	
	N	%	N	%	N	%	N	%	N	%
Absence of geometric shapes	6	42.9	8	57.1	7	50	8	57.1	8	57.1
Shape drawn with no appearance of a given geometric shape	/	/	/	/	1	7.1	/	/	/	/
Shape drawn lesser extent has the appearance of a given geometric shape	/	/	/	/	1	7.1	2	14.3	/	/
Shape drawn largely has the appearance of a given geometric shape	1	7.1	/	/	/	/	/	/	1	7.1
Shape drawn correct form of the required geometrical shape	2	14.3	2	14.3	/	/	/	/	/	/
Drawn shape completely accurate in relation to a given geometric shape	5	35.7	4	28.6	5	35.7	4	28.6	5	35.7

The results presented in Table 2 shows student achievement on the test drawing geometric shapes. Students with cerebral palsy and associated mild intellectual disability exercised poor achievements in this test. Absence of geometric shapes while drawing a circle is present in 42.9% of the students, squares 57.1% students, 50% of the cross, diagonal lines at 57.1% and 57.1% at triangle. A small number of students can drawn in a form that is completely accurate in relation to a given geometric shapes, with the best accomplishments achieved in drawing the circle, cross and triangle (35.7%).

Table 3 *Correlation of skill drawing geometric shapes and kinesthetic sensitivity hand*

Kinesthetic tasks		Achievements at Acadia test									
		Drawing a circle		Drawing squares		Drawing cross		Drawing diagonal lines		Drawing triangle	
		r	p	r	p	r	p	r	p	r	p
Kinesthetic sensitivity hand (task 1)	Right hand	0.707	.005	0.966	.000	0.942	.000	0.966	.000	0.978	.000
	Left hand	0.607	.021	0.750	.002	0.774	.001	0.750	.002	0.804	.001
Kinesthetic sensitivity hand (task 2)	Right hand	0.750	.002	0.915	.000	0.912	.000	0.915	.000	0.947	.000
	Left hand	0.607	.021	0.750	.002	0.774	.001	0.750	.002	0.804	.001

Correlation is significant at the 0.05 level

The results in Table 3 shows the existence of a correlation between the kinesthetic sensitivity of the hands and drawing geometric shapes. Given the correlation between the level of $p<0.05$ between kinaesthetic sensitivity of the right hand during the presentation of the first task in which the children had task with eyes closed, after a demonstration, brought his thumbs to his ring finger, and the skills of drawing a circle (p= .005), drawing squares (p= .000), drawing cross (p= .000), slashes (p= .000) and drawing a triangle (p= .000) there was significant correlation. During the performance of the task on left hand, recorded the existence of a correlation between the kinestetic sensitivity hand and skills of drawing a circle (p= .021), square (p= .002), cross (p= .001), diagonal lines (p= .002) and triangle (p=. 001). Between kinaesthetic sensitivity of the right hand which is evaluated through a test that included merger of thumb with themiddle finger, after the demonstration, eyes closed, and the skills of drawing a circle (p= .002), square (p= .000), cross (p= .000), slashes (p= .000) and the triangle (p= .000) record the existence of significant correlations. During the performance of the task on left hand, recorded the existence correlation between kinesthetic sensitivity hand and drawing a circle (p= .021), square (p=. 002), cross (p= .001), slashes (p= .002) and triangle (p=. 001). The results show the existence of a positive correlation between skill drawing geometric shapes and kinesthetic sensitivity of hand children with cerebral palsy and associated mild intellectual disability.

As the second task of the research relates to showing the connection of tactile perception of children with cerebral palsy with the skills of drawing geometric shapes, and other initial assumption is that tactile perception is an important determinant of the skills of drawing geometric shapes, the analysis of the achievements is done with Spearman's correlation coefficient. In Table 4 shows the achievements on tests tactile sensitivity of the hands and in Table 5 shows the correlation between the examined parameters.

Table 4 *Student achievement on the test tactile sensitivity hand*

Tactile sensitivity hand	Right hand						Left hand					
Localization tactile touch	0 errors		2-8 errors				0 errors		2-8 errors			
	N	%	N	%			N	%	N	%		
	12	85.7	2	14.3			12	85.7	2	14.3		
Discrimination sharp-dull	0 errors		1 error		2-5 errors		0 errors		1 error		2-5 errors	
	N	%	N	%	N	%	N	%	N	%	N	%
	5	35.7	3	21.4	6	42.9	3	21.4	5	35.7	6	42.9
Discrimination strength pressure	0 errors		1 error		2-4 errors		0 errors		1 error		2-4 errors	
	N	%	N	%	N	%	N	%	N	%	N	%
	4	28.6	1	7.1	9	64.3	4	28.6	/	/	10	71.4
Discrimination two points of contact	5 mm		10 mm		more than 10 mm		5 mm		10 mm		more than 10 mm	
	N	%	N	%	N	%	N	%	N	%	N	%
	1	7.1	3	21.4	10	71.4	2	14.3	3	21.4	9	64.3
Determining the direction of contact	0 errors		1-2 errors				0 errors		1-2 errors			
	N	%	N	%			N	%	N	%		
	4	28.6	10	71.4			6	42.9	8	57.1		
Graphesthesia – forms	0 errors		1 error		2-3 errors		0 errors		1 error		2-3 errors	
	N	%	N	%	N	%	N	%	N	%	N	%
	3	21.4	3	24.4	8	57.1	3	21.4	4	28.6	7	50
Graphesthesia – numbers	3	21.4	5	35.7	6	42.9	1	7.1	5	35.7	8	57.1
Stereognosis	0 errors		1 error		2-4 errors		0 errors		1 error		2-4 errors	
	N	%	N	%	N	%	N	%	N	%	N	%
	3	21.4	8	57.1	3	21.4	4	28.6	6	42.9	4	28.6

The results presented in Table 4 shows the achievements of students with cerebral palsy in the test of tactile sensitivity of hands. The best achievements of students performed during the execution of the task of localization of tactile prefer, where the largest number of students (85.7%) did not record any mistakes when performing this task. When discrimination sharp and blunt pen works, only 35.7% of students in discrimination on the left arm and 21.4% in the right hand, do not record any error, while the rest of the students present one or more errors. When discrimination strength pressure, recorded the highest number of students from 2 to 4 is errors in the discrimination of the right hand (64.3%) and 71.4% on the left hand. When discrimination two points of contact, the students best discriminate contacts at a distance of more than 10 mm, 71.4% students on the right hand and the left hand 64.3%. In determining the direction of the contact, the students recorded the highest percentage of 1 to 2 errors, 71.4% on right hand and 57.1% on left hand. During the task graphesthesia when students had the task to recognize geometric shapes that are drawn on the palm of their hand, 57.1% of students recorded 2 to 3 errors on their right arm and 50% on the left hand. During the execution of the following task graphesthesia, when students had the task to recognize the numbers that are printed on the palm of the hand, 42.9% of students recorded 2 to 3 errors on the right hand and 57.1% in the left hand. During the execution task stereognosis, where students had the task to recognize items that have been in the arm, while the eyes are closed, the largest number of students recorded after 1 mistake on his right arm (57.1%) and left arm (42.9%).

Table 5 *Correlation of skill drawing geometric shapes and tactile perception*

Tactile tasks		Achievements at Acadia test									
		Drawing a circle		Drawing squares		Drawing cross		Drawing diagonal lines		Drawing triangle	
		r	p	r	p	r	p	r	p	r	p
Localization tactile touch	Right hand	0.433	.122	0.342	.232	0.388	.170	0.342	.232	0.346	.226
	Left hand	0.433	.122	0.342	.232	0.388	.170	0.342	.232	0.346	.226
Discrimination sharp-dull	Right hand	0.370	.193	0.607	.021	0.578	.030	0.607	.021	0.648	.012
	Left hand	0.395	.162	0.633	.015	0.620	.018	0.633	.015	0.688	.007
Discrimination strength pressure	Right hand	0.521	.056	0.541	.046	0.556	.039	0.672	.008	0.600	.023
	Left hand	0.398	.156	0.397	.160	0.430	.125	0.529	.052	0.469	.091
Discrimination two points of contact	Right hand	0.611	.020	0.873	.000	0.756	.001	0.751	.002	0.759	.001
	Left hand	0.354	.214	0.621	.018	0.506	.065	0.516	.059	0.551	.041
Determining the direction of contact	Right hand	0.545	.044	0.617	.019	0.645	.013	0.750	.002	0.670	.009
	Left hand	0.707	.005	0.966	.000	0.942	.000	0.966	.000	0.978	.000
Graphesthesia – forms	Right hand	0.669	.009	0.929	.000	0.882	.000	0.929	.000	0.916	.000
	Left hand	0.407	.149	0.696	.006	0.636	.014	0.696	.006	0.686	.007
Graphesthesia – numbers	Right hand	0.562	.036	0.842	.000	0.761	.002	0.842	.000	0.821	.000
	Left hand	0.593	.025	0.779	.001	0.751	.002	0.779	.001	0.799	.001
Stereognosis	Right hand	0.737	.003	0.730	.003	0.712	.004	0.730	.003	0.693	.006
	Left hand	0.768	.001	0.843	.000	0.822	.000	0.764	.001	0.801	.001

Correlation is significant at the 0.05 level

The results in Table 5 shows the existence of a correlation between the tactile perception and skill of drawing geometric shapes. During the task of localization tactile touch, respondent has localize the tactile tease while eyes are closed, touching by the examiner, and the results show that the localization of these tactile on the left and right side of the body doesn't correlate with the skills of drawing geometric shapes. During the task sharp-dull discrimination, the respondent has a task to assess whether the examiner touches sharp or blunt part of pencil/pin, and the results show that this kind of discrimination of tactile stimuli correlated with the skill of drawing squares (p= . 021), cross (p= . 030), slashes (p= .021) and the triangle (p= .012) in the right hand, as well as drawing a square (p= .025), cross (p= .018), slashes (p= .015) and the triangle (p= .007) in the left hand. During the task discrimination strength pressure respondent has a task to assess the strength of the skin by the examiner, and the results show that the strength of touch is in correlation with the skill of drawing squares (p= .046), cross (p= .039), slashes (p= .008) and the triangle (=.023) during the execution of tests on his right hand, while performing during the task on the left hand not present correlation. During the task discrimination two points of contact, examiner estimated distances discrimination two tactile stimulus which the examinee may be perceived, and the results show that this kind of tactile discrimination is very important and correlated with the skill of drawing, on the right hand. It is noted the existence of correlation with drawing a circle (p= .020), square (p= .000), cross (p= .001), slashes (p= .002) and the triangle (p= .001) in the right hand, and drawing squares (p= .018) and the triangle (p= .041). During the performance tests determine the direction of contact, the existence of correlations on the right and on the left hand with the skill of drawing a circle (right hand p= .044, left hand p= .005), square (right hand p=.019, left hand p= .000), cross (right hand p=.013, left hand p=.000), slashes (right hand p= .002, left hand p=.000) and triangles (right hand p=.009, left hand p= .000). During the execution of the first task graphesthesia, children must to recognize geometrical shape that is written on the palms, while eyes closed. The results shows that the graphesthesia is very important skill for drawing geometric shapes, and that is correlated with drawing a circle (right hand p= .009), square (right hand p= .000, left hand p= .006), cross (right hand p= .000, left hand p= .014), slashes (right hand p= .000, left hand p= .006) and triangles (right hand p= .000, left hand p= .007). During the conduct of another task graphesthesia, children must to recognize numbers who are printed on the palms, while eyes closed. The results shows that the graphesthesia is very important skill for drawing geometric shapes, and that is correlated with drawing a circle (right hand p= .036, left hand p= .025), square (right hand p= .000, left hand p= .001), cross (right and left hand, p= .002), slashes (right hand p= .000, left hand p= .001) and triangles (right hand p= .000, left hand p= .001). The results shows that the stereognosis is very important skill for drawing geometric shapes, and that is correlated with drawing a circle (right hand p= .003, left hand p= .001), square (right hand p= .003, left hand p= .000), cross (right hand p= .004, left hand p= .000), slashes (right hand p= .003, left hand p= .001) and triangles (right hand p= .006, left hand p= .001).

DISCUSSION OF RESULTS

When assessing the integration of tactile-kinesthetic sensitivity of the hands and the ability of drawing geometric shapes, students with cerebral palsy and associated mild intellectual disability, realized poor achievements on the test tactile and kinaesthetic sensitivity of hands, and on Acadia test. These students during the execution of the tasks for the evaluation of kinaesthetic sensitivity hand, achieve better achievements in their right hand, while only 42.9% of the students during the execution of the first task and 35% of the students during the second task achieved good results. Assessment of tactile sensitivity of hand come to the conclusion that the best achievements of students performed during the execution of the task of localization of tactile prefer, where the largest number of students (85.7%) did not record a single mistake. During the sharp-dull discrimination, discrimination volume pressure, determining the direction of contact, graphesthesia geometric shapes and numbers and stereognosis, over 50% of the students recorded one or more mistakes on both hands. For most of the students recorded the absence of a given geometric shape, during drawing a circle 42.9% of pupils, while when drawing the square, cross, triangle and diagonal lines in more than 50% of the students.

Results from this study show that kinesthetic perception is determinant of drawing skills. We record the presence of correlation between the sensitivity of the hands and kinesthetic skills of drawing geometric shapes. Between kinaesthetic sensitivity of the right hand during the performance of both task and drawing squares (p=.000), cross (p=.000), slashes (p=.000), triangle (p=.000) and a circle (p=.005, p=.002), there is a significant correlation which is present at the performance of these task left hand.

Results from this study also show that the tactile perception is determinant of drawing skills. The strongest correlation between the examined parameters was found between discrimination two points of contact with drawing a circle (p=.020), square (p=.000), cross (p=.001), slashes (p=.002) and the triangle (p=.001) on the right hand and on his left hand. Also, graphesthesia is very important skill for drawing geometric shapes, and is correlated with drawing a circle (p=.009), square (p=.000), cross (p=.000), slashes (p=.000) and triangle (p=.000), as well as graphesthesia numbers. Stereognosis also correlated with drawing a circle (p=.003), square (p=.003), cross (p=.004), slashes (p=.003) and the triangle (p=.006).

Correlation is present between discrimination sharp and blunt stimuli, discrimination strength pressure, determining the direction of contact and drawing a circle, square, cross, triangle and diagonal lines, while the localization of tactile touch isn't determinant of drawing.

Soldo, Janeković and Grozdek were nearly 30 years ago (1987) conducted a study to evaluate the ability of drawing a shape of children with cerebral palsy aged 8 to 10 years, using the Acadia test on a sample of 15 students. How they would sure that the ability of drawing shapes are improves, they conducted a special treatment. One group with five students conducted visual-motor treatment with another group taktile-manipulative treatment and the third group combined visual-motor and taktile-manipulative treatment. The obtained results show the existence of improving skills of drawing shapes in all three experimental group subjects.

Rapaić, Nikolić and Nedović (1995) evaluated the graphomotor abilities of children with cerebral palsy, and examine the ability of drawing shapes 68 students, aged 7 to 16 years. As the instrument is used Acadia test, and the results show that more than 66% of these students have extremely bad graphomotor capabilities. The success of implementation of tasks decreases going toward more complex geometric shapes. Score 0, or score which assesses drawn shape that does not fit in any element of a given geometrical shape is present in the majority of cases (34.57%). Based on these results, it can be concluded that the graphomotor ability of these students are very bad. Good graphomotor capabilities are present in 8.74% of the students. Less successful were present in 40.67% of the students, while the majority of students (50.84%) present extremely bad graphomotor capabilities.

Nedović, Trgovčević, Kulić and Marinković (2012) estimated the graphomotor abilities of children with cerebral palsy at the age of 17 pupils, aged 7 to 16 years, on the level of mild intellectual disability. One of the used tests is also Acadia test, subtest drawing shapes. The obtained results show that gender is determinant which is correlated with the achievements in the subtest drawing a shape, but it was not statistically significant (p>0,05), and more than 60% of student with cerebral palsy have poor graphomotor skills.

Dimić and Soldo (1990) show the importance of special education treatment in the preparation children with cerebral palsy for school learning. By measuring the achievements of all the subsets of Acadia test and application of psychomotor therapy through exercise experience physical integrity, exercises detecting the position of the body in space, exercise to improve handling skills, practice visual perception, memory exercise, show a significant improvement in the achievements of Acadia test.

Study results Winger et al. (2009) showed that people with cerebral palsy have proprioceptive deficits on both sides of the body. Evans (2007), based on studies conducted with a group of patients with cerebral palsy (15 patients) and the group of patients without cerebral palsy (15 patients), came to the result that the level of cerebral palsy significantly correlated with passive reproduction movement. Opila-Lehman et al. (1985) evaluated the kinesthetic ability of children with spastic and athetoid cerebral palsy, ranging in age from 8 years 7 months through 15 years 8 months, and found that the children with cerebral palsy had decreased kinesthetic ability, compared to children of the same age without cerebral palsy.

To test the tactile perception of children with cerebral palsy, Auld et al. (2012) conducted a study on a sample of 52 children with cerebral palsy, aged 8 to 18 years and 34 children with typical development. To level the motor skills of respondents, was applied Gross motor function classification system and the ability Manual classification system, a cause of the involved subjects who belong to the group one and two. Children with cerebral palsy experience significantly poorer achievements of children with typical development. 40% of these respondents have a tactile deficits. Kinnucan et al. (2010) emphasize the correlation of stereognosis and motor function in patients with cerebral palsy.

CONCLUSION

Drawing skills and the quality of the drawings may serve us as an indicator of child development. Therefore, already at an early age, using the drawing, can be defined models of support and stimulation of skills that are important for this skill. Tactile and kinestetic sensitivity of hands are abilities which must be stimulated in an early age, all with the aim of fostering the skills of drawing, and therefore writing. Activities such as games with materials of different textures, capturing and inserting the object of various sizes, play imitations and placing the body in a different position, are some activities that can be implemented on a daily basis.

Despite the limitations of a small, conveniently sample, without control group, the results support the theoretical assumptions and the results of other studies which show the importance of kinesthetic perception and tactile sensitivity in handling pencil and overcoming acitity, that are very important in modern society.

Today, due to technological developments, in a growing number are available assistive devices that can help students with cerebral palsy in overcome the skills of drawing and writing.

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BILINGUALISM WITH DEAF AND HARD OF HEARING PRESCHOOL CHILDREN[a]

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SUMMARY

Bilingualism of a deaf child means the knowledge and regular use of sign language, which is used by the community of the deaf, and the spoken language, which is used by the majority who can hear. Knowing and using sign and spoken language, deaf and hard of hearing children will realize their full potential in intellectual, speech and social development.

The knowledge of sign language from the earliest age helps deaf children acquaint with the world, develop their cognitive abilities, communicate with their parents and the surroundings.

The creation of suitable early intervention programmes focusing on the family which offer the possibility of choice for parents and deaf and hard of hearing children is necessary.

At preschool age, the task of a nursery school is to enable children to continue to learn the language which they started learning in the family (sign or spoken language). Children will learn both linguistic modalities the best though the interaction with other fluent speakers (adults and children).

The aim of the research was to examine the level of knowledge of sign and spoken linguistic expression with deaf and hard of hearing preschool children within 5 lexical areas: family, food and drinks, professions, home, travels. Stimulus pictures were used in the research. The sample comprised 11 children attending preschool classes at schools for deaf and hard of hearing children.

Sign language with preschool children was more developed and richer in comparison to their spoken linguistic expression. On average, deaf and hard of hearing children used more signs (gestures) than spoken words.

The best results were achieved within the lexical area of Food and Drinks, while the poorest results were achieved in the area of Professions.

There are great individual differences in the number of used words within different lexical areas. The deficiency in sign and spoken linguistic expression within the width of vocabulary and lexical readiness as well as within the understanding of the meaning of words was observed.

The development of the entire personality of a deaf child (emotional, social and cognitive development)is to a great extent determined by auditory deprivation and difficulties in language acquisition. As a result, difficulties in using and understanding terms occur.

Key words: bilingualism, sign and spoken linguistic expression, deaf and hard of hearing preschool children

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INTRODUCTION

Early bilingualism in hearing impaired children (knowledge of sign language and spoken / written language) is invaluable for their development.

Appropriate and effective early communication, regardless of within which linguistic modality it takes place (signed or spoken), together with the acceptance of the child and its impairment is the basis of successful cognitive development and the development of the child's personality, which is the basis of communication and of building the language skills (Ann, 2001; Meir, 2002; Perniss, Pfau & Steinbach, 2007).

Sign language is a language that deaf children spontaneously adopt and learn, like normal hearing children adopt the spoken language of their environment. The adoption of sign language eliminates the problems of limited receiving of messages and limited communication.

When communicating with a deaf child, speech that is followed by a gesture-sign should be used until the child learns a spoken word and understands its meaning.

Communication of a deaf child in the family

It is necessary to detect hearing impairment in a child early and to implement the Early Intervention Program as early as possible.

The local community, the state, as well as health and education projects must focus their goals towards early detection of hearing impairment and early intervention (ASHA, 2001), according to (Pribanić, 2004).

The family of a child with impaired hearing should have access to all the information on the general development of the child, information on hearing loss, communication abilities and language development in deaf children.

About 90% of deaf children were born in families with two hearing parents, 7% have one deaf parent, and only 3% have two deaf parents (Marschark, 1993). Approximately 5-10% of deaf children adopt sign language from their deaf parents (Mitchell & Karchmer, 2004). Most deaf children grow in a completely normal hearing world in early childhood. Also, most of the hearing parents of deaf children have no knowledge, or have poor knowledge of sign language, which has significant implications for the development of the deaf child.

The deaf child requires to be included in the process of rehabilitation of hearing and speech early, which is a prerequisite for the child's progress in language development and speech development, as well as in psychosocial and emotional development. It acquires its experience in various ways, but its most influential and most responsible teacher is its parent. Parents should be educated about hearing loss, its consequences and communication, upbringing and education of the deaf child.

Greater support of the community is required, especially of its professional services:of special education and rehabilitation, medical, social and educational. It is necessary to improve communication within the family system, as well as the cooperation of the family and professionals in various specialties who are involved in the rehabilitation and education of deaf children (Vujasinović and Slavnić, 2008).

Bilingualism in deaf and hard of hearing children of preschool age

"Bilingualism is the knowledge and regular use of two or more languages. Bilingualism of the "sign language – spoken language" type is the only way for the deaf child to meet its needs, i.e. to, from an early age, communicate with its parents, develop its cognitive ability, get to know the world, communicate fully with the environment and acculturate into the world of those who hear and the world of the deaf" (Grosjean, 2001).

Bilingualism in a deaf child implies knowledge of sign language used by the deaf community and the spoken language used by the hearing majority.

When linguist William Stokoe began studying the structure of American Sign Language in the fifties and when, in 1960, he published the book "Sign Language Structure, Studies in Linguistics" in which he points out to the value and richness of sign language, valuing that system of communication, which has its own syntax and grammar and is independent of oral (spoken) language, began again all over the world.

Bilingualism of the hearing is different from the bilingualism of the deaf.

Bilingual normal hearing children, as well as deaf children, learn two languages. The difference is that they learn L2 through auditory means, in the same modality as L1 (Knight & Swanwick, 2002).

Deaf children learn two languages in two modalities, which is considerably more complex.

When normal hearing children learn L2, it is completely available to them and it is not limited by any physical factors. Deaf children can not fully hear their L2. In the mode of adoption of L1, there are also differences.

Adoption of sign and spoken language in deaf and hard of hearing children

Sign and spoken languages include various perceptual and productive systems. While spoken languages include mechanisms of auditory processing and speech production, sign languages are perceived visually, and their articulation involves the systematic use of parts of the body and space (Kovačević, 2013; Plaza-Pust, 2005).

Deaf children who are exposed, from the earliest age, only to sign language go through the same basic levels of language acquisition as normal hearing children who learn to speak in their environment (Bonvillian & Folven, 1993; Drasgow, 1998).

To be able to, in a proper way, study the language development in hearing impaired children, as well as the deviations that occur in this development, one must be familiar with the speech development of normal hearing children. Only in this way one can detect and understand all the side effects of hearing impairment and their impact on the process of developing speech (Đoković, 1997).

The natural process of speech and language development takes place under the influence of speech-language environment.

Anderson (2006), points out to the data obtained by Anderson & Reilly (2002) in their study. The obtained data points out to remarkable similarity of the first signs and words in ASL – American Sign Language and English spoken vocabulary. These authors point out that it is evident that from the age of 18 – 23 months, the productive vocabularies (of signs or words) of deaf and normal hearing children, when compared, are more or less the same.

The list of the first words, or gestures-signs that children adopt, points out to very strong similarities between the early lexical contents in deaf and normal hearing children.

The first signs-gestures of deaf children are semantically similar to the first words that are produced by normal hearing children.

In the phase of single-element statements, deaf children also use isolated signs or words – nouns or verbs (for example: mother, father, baby, eat, drink, milk, ball, dog ...), just like normal hearing children do.

Deaf children at the age of 12 months produce the first 10 signs, they produce 50 signs at the age of 20 months (Mayberry & Squires, 2006).

Deaf mothers, sometimes move or hold the hand of their deaf child in order to form a certain sign (Erting, Prezioso & O'Grady Hynes, 1990).

At the beginning of adopting sign language deaf babies make similar mistakes in producing signs as normal hearing children make in the articulation of vocals in spoken language. In the natural interaction of deaf children aged 19–24 months with their deaf mothers a total of 1018 signs was analyzed. In the production of the first signs, the children made mistakes in the first hand shapes, substitution, and they often repeated the same signs (Morgan, Barrett-Jones & Stoneham, 2007).

Deaf children (usually of hearing parents) who are beginning to learn sign language after the critical period for language acquisition (until the end of their fifth year of age) have, on average, worse language skills in sign language.

For the deaf children of hearing parents, their first language will be spoken language. If hearing parents choose sign language, it will not be adopted in the same way as is the case with the deaf children of deaf parents.

Hearing adults use spoken language simultaneously with sign language, and in addition to that, their skills of emission and reception of sign language are often incomplete and are under strong influence of the structure of spoken language.

Vigotski (1996) points out that the experience of a child who can hear is richer, because oral speech is directed at auditory signals. A child with impaired hearing encounters insurmountable difficulties in acquiring experience because it should receive oral speech in a visual way, which is incomplete and limited, and it is very difficult for the child to generalize the experience and express himself or herself verbally.

The vocabulary volume, the character of the words, the frequency of words' use are conditioned by the development of children's abilities, the domain of their interests, the influence of the social environment, as well as the program contents that are applied in the educational work with children of preschool age (Kovačević, 2012).

Kristal (1996) describes the contents of the first vocabulary.

Young children talk about what is going on around them – about here and now – and quickly build vocabulary in several semantic fields.

People – relatives and visitors to the home (dad, grandma, man, postman, grandfather). *The actions, the way things are moving* (to give, to jump, to kiss, left), and *routine activities in the children's home* (bye-bye, goodbye, hello). Food, time for meals, as well as products (lunch, milk, juice, beverage, apple). *Body parts* –the words that are usually learned first are those that describe the face (mouth, nose), and then the other parts of the body (fingers, hands) and bodily functions. *Clothes*- everything that you wear and put on your body (diaper, shoe, coat). *Animals* – whether real, in pictures or on TV (doggy, cat, horse, lion). *Vehicles*– objects and the sounds that they emit (car, beep-beep, vooRRR, vooRRR, vooRRR). *Toys and games* (ball, cube, book, doll, hide and seek). *Objects in the house* – everything that is related to their daily routine (glass, spoon, brush, clock, light). *Locations*- several general words (there, to watch, inside, above). *Social word*s – voiced reactions (aha, yes, no, thank you). *Descriptive words* – the first adjectives (beautiful, big). *Situational words* – several "demonstrative" words (deixis) – (that, my, they).

In developing the child's vocabulary, not only developing its ability to understand, but also to actively use larger and larger numbers of words have an important place.

Daniels (1993) points out that the hearing children of preschool age who are learning ASL as a first language (the normal hearing children of deaf parents) can be in an advantageous position during the adopting of the vocabulary of the English language. Testing was carried out with PPVT (Peabody Picture Vocabulary Test). The study included 14 normal hearing children of deaf parents. The children had early sign-linguistic communication and in the pictorial vocabulary test they achieved significantly better results than were the anticipated norms for that age group. The author finds that being exposed to spoken and sign language at an early age facilitates the adoption of an active vocabulary.

The basic problem in the development of speech in deaf children is a matter of active vocabulary (words that are used in everyday speech and everyday life situations). The process of enriching the vocabulary is primarily based on associating words with objects, things and phenomena that children correspond with, or which they perceive.

Deaf and hard-of-hearing children of preschool age acquire concepts by direct observation of objects and phenomena. Children learn to observe things, to observe changes that occur, to analyze, compare, find the common and the different, remember the properties and qualities of objects and use them in games. For preschool children, it is especially important to develop certain concepts and categories of words that appear in related situations, such as the notion of color; shape and characteristics; the notion of space; the notion of self; the notion of time; the notion of numbers and quantities, and other notions. It is about perceptions, creating the notion and categories of words that express that notion, or kinds of words with which that notion can be expressed.

Through taking part in a series of independent, focused and combined activities in all fields of educational work, deaf and hard of hearing children have contact with toys, obvious means of teaching and other items and objects, and learn their names, recognize the similarities and differences between them, that is, learn their properties (Kovačević, 2013).

WORK METHOD

The aim of the study

The aim of this study was to examine the level of acquisition of sign and spoken language expression in deaf and hard of hearing children of preschool age, within five lexical fields.

The sample

The sample consisted of 11 children who attend pre-school groups in schools for deaf and hard of hearing children in Serbia. Five children had cochlear implants, and six children wore hearing aids. 4 out of the 11 surveyed preschool children were girls and 7 were boys.

The instrument

For the children of preschool age, stimulus pictures of terms from five lexical fields (family, food and drink; professions; house; travels) from the book "My first Picture Dictionary of the Serbian language" (author V. Babić) were used. The book is intended for children of preschool age. At the time when they get to know the world around them, this book can help them to become familiar with an array of words by which we name beings, objects and phenomena from the environment, near and far, and to learn to interconnect these words into thematic units.

The obtained linguistic materials were quantitatively and qualitatively processed.

In the paper, descriptive statistics (mean with its corresponding standard deviation, as well as minimum and maximum) was used. The qualitative analysis of the obtained responses was performed and the kinds of mistakes that had been made were analysed.

THE SURVEY RESULTS WITH DISCUSSION

Table 1 *Results of deaf and hard of hearing children of preschool age within the sign and spoken language expression, within five lexical fields: Family, Food and Drink, Professions, Travel, House*

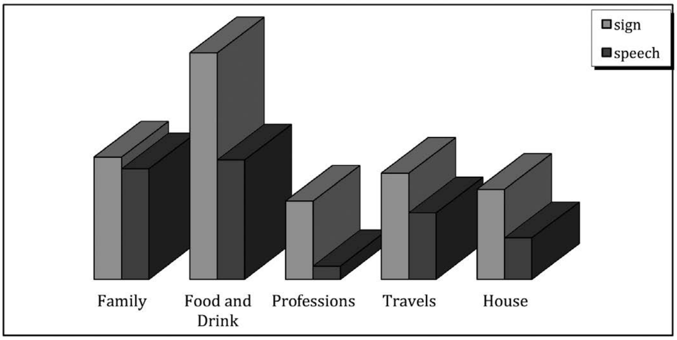
	AS	SD	Min.	Max.
Family sign	7.55	1.440	5	10
Family speech	6,82	1.834	3	9
Food and Drink sign	14.00	7.141	3	24
Food and Drink speech	7.36	5.887	1	19
Professions sign	4.82	3.920	0	11
Professionsspeech	0.82	1.834	0	6
Travels sign	6.55	2.583	2	11
Travels speech	4.09	3.300	0	11
House sign	5.55	3.446	1	12
House speech	2.55	3.205	0	8

Preschool children included in the survey achieved the best results within the *Food and Drink* field within sign language. The average value of correctly used words is AS=14.00, SD= 7.141. The largest number of used words is 24. A much smaller number of words was used in the lexical fields: *Family, Travel* and *House*.

The worst results were obtained in the *Professions* field within speech. The average value of correctly used words is AS= 0.82,with the standard deviation of 1.83. The largest number of correctly used words is 6.

The obtained results indicate better acquisition of sign language expression, in comparison to spoken linguistic expression.

It is characteristic that some children did not use any words properly within the lexical fields: *Professions* (sign – gesture and speech); *Travels* (speech) and *House* (speech).



Graph 1 The number of words that the deaf and hearing impaired preschool children of preschool age used within the lexical fields: family, food and drink, professions, travels, house within sign language expression and spoken linguistic expression

Deaf and hearing impaired children of preschool age used a total of 423 words, within five lexical fields, within sign language expression, 38.45 words on average. Within spoken linguistic expression, they used a total of 238 words, 21.63 words on average.

Preschool children with cochlear implants and hearing aids, used the largest number of words within the *Food and Drink* lexical field*,* within sign language expression – the total number of words is 154. 14 words on average; 81 words within spoken linguistic expression, 7.36 words on average.

A significantly smaller number of words was used within the lexical fields: *Family, Travel, House.*

The smallest number of words was used within the *Professions* lexical field. Within sign language expression – the total number of words is 53; 4.82 words on average.

Within spoken linguistic expression – the total number of words is 9; 0.82 words on average.

Through an analysis of the obtained results in preschool children within five lexical fields (*family; food and drink; professions; travels; house*), it can be concluded that a larger number of words was used within sign language expression, in comparison to the spoken language expression.

Sign vocabulary of preschool children is more developed and with more content in comparison to the spoken vocabulary. There are large individual differences in the number of words used within different lexical fields. The results obtained in preschool children, indicate that the number of used words is different in each of the five surveyed fields.

Within sign and spoken forms of expression, the children gave the highest number of words within the *Food and Drink* lexical field.

In the analysis of the obtained words in the *Food and drink* field, the following distinctions could be made: food-drinks, sweets, fruit, vegetables, prepared food items or foods like bread, and the like.

The study by Kovačević-Gavrilović and Mitić (2004),confirms the obtained results. The authors examined the specifics of lexical development of preschool children with regular speech and language status. The research results indicate that children most often name body parts, games and toys, food and drink.

The children with preserved hearing are the ones to adopt, at the earliest, and produce numerous nouns that denote animals and food. Children rarely use nouns that signify people's professions (i.e. fire-fighter) (Fagan & Pisoni, 2010).

The obtained conclusions were confirmed by the results of the study by Kovačević (2005) in the study of lexical aptitude of deaf and hard of hearing children within different lexical fields.

The most frequently used words in sign and spoken expression, within the *Food and Drink* lexical field are: *meat, eggs, bread, salt, cheese*; fruits: *apples, lemon, grapes, banana*, *strawberry*; vegetables: *potato, paprika, onion*; beverages: *water, milk, juice*; sweets: *chocolate and bonbon*.

Certain words are given only within the sign mode of expression: *frankfurter, yogurt, grapes*, *orange, paprika, carrot, pear, sugar, salami, jam, chocolate, bonbon, mineral water, coffee.*

Since images were used as an incentive, it is characteristical that a small number of terms was perceived inadequately: frankfurter –*banana*; tea in a box on which there is a picture of flowers (*flower*).

The smallest number of words was provided by deaf and hearing impaired children within the *Professions* lexical field. There is a visible difference between the obtained sign vocabulary (53 words) and spoken vocabulary (9 words).

The obtained results indicate, like the results of Mayberry (2002), research, that, for deaf children, adopting and learning spoken language is very difficult and it requires extraordinary effort by the deaf child and its parents (Hermans et al., 2008).

Key elements in adopting and learning the language in deaf children are: early detection of hearing impairments, early involvement in the education system and early contact with fluent sign language users (Goldin-Meadow & Mayberry, 2001).

Normal hearing three year olds have adopted speech vocabulary that includes an average of between 1,000 and 2,000 words. In a study authored by (Sainsbury & Loyd-Evans, 1986), deaf five-year-olds had speech vocabulary that included less than 29 words (Ross, Storbeck & Wemmer, 2004).

The results listed by Lach et al. (1970), according to Mayberry (2002), in the course of early intervention during intense learning of spoken language, within a period of 15 months, a 30 month old deaf child, could only learn one word in a month.

Some differences were observed in certain lexical fields, in relation to the total number of words and different ways of expression in preschool children.

The obtained results were confirmed by the results obtained in studies by Kovačević, Isaković and Dimić (2010); Dimić, Kovačević & Isaković (2011); in which the deficiency of sign and spoken language expression; the level of lexical aptitude of deaf and hard of hearing preschool children were examined, as well as differences in certain lexical fields and sign and speech mode of expression in deaf and hard of hearing children of preschool age.

Through qualitative analysis within the five lexical fields: *Family, Food and Drink, Professions, Travels* and *House* in deaf and hard of hearing children of preschool age, the most frequently used terms were obtained, as well as specific and inadequate responses.

The most frequently used words within the *Family* lexical field are: *mom, dad, grandma, grandpa, brother, sister, baby*. Within the *Family* lexical field, one term was used inadequately: *dog*. All the terms were given in sign language expression and spoken language expression.

Within the *Travels* lexical field, the most frequently used words are: *car, plane, bus, boat, train.* The terms that were given only in sign language expression are: *helicopter* and *kayak*. Inadequately used terms are: *balloon, rocket* and *bird*.

Within the *House* lexical field a large number of inadequate or specific responses was given by the deaf and hard of hearing children of preschool age. The most frequently used words within the *House* lexical field are: *window, door, table, room, roof*. The words *window, door*, are as a rule, in the first or second place on the lists by all respondents. The terms that were given only in sign language expression are: *kitchen, bathroom, TV-set, terrace, door handle, stairs, fence*. Inadequate responses are: bedroom – *room sleeps;* bathroom –*bathed*; *water bathes*; kitchen-*water eats*; roof – *red.*

The specificity of the response of preschool children within this lexical field is specifying the actions that take place in certain rooms in the house. For example: bedroom – *sleeps*; bathroom-*bathes*; kitchen- *washes*; living room-*looks*. The responses were given in sign language expression and spoken language expression. Specific answers are: stairs- *above;* armchair – *sits*.

Two children used the term *mailbox* in sign language expression.

One child with a cochlear implant used onomatopoeia for certain terms. A sign-gesture was used together with pronunciation. For example: bath- *shhh, sss*; washing machine – *boo, boo*; stove- *shh*.

There is also a number of terms that were inadequately used and that the deaf and hearing impaired children of preschool age tied to the *house* and *parts of the house*: *road, grass, mom, tree, smoke, sister, rabbit, cat.*

Within the *Professions* lexical field the smallest number of words was used. The most frequently used words were: *painter, bricklayer, cook, hairdresser*. Within this field, a large number of words within sign language was given. Words that were given only in sign language expression are: *policeman, fireman, singer (female), paintress, seamstress, driver, baker*.

It is specific that some children with cochlear implants named terms in sign – gesture, with pronouncing the sentence. For example, seamstress (the term given in sign – gesture) with the pronunciation *mother sews*; singer (female) – *woman sings*; driver – *dad drives;* paintress – *woman paints*; hairdresser – *boy cuts hair*; carpenter – *boy cuts wood;* shoemaker – *grandfather repairs shoes.*

The given replies are typical for particular children with cochlear implants, in whom spoken linguistic expression is more developed.

Cochlear implant has a significant advantage over conventional hearing aids in increasing the successfulness of development of speech in deaf and very hard of hearing children.

Research shows huge diversity in the ability to understand speech in children with cochlear implants. Children who, before the installation of implants, did not adopt speech and language require intensive rehabilitation (Kovačević, 2012).

There are huge individual differences in gaining speech and language skills in pre-lingually grown deaf children who use a cochlear implant. Some children use their cochlear implant very well, while others make only minimal progress (Blamey et al., 2001; Hodges et al., 1999; Kirk et al., 2000; Pisoni et al., 2000; Sarant et al., 2001; according to: Đoković, Ostojić and Kovačević, 2012).

Specific and inadequate responses were also given, depending on how children perceived images. The replies were given by both children with hearing aids and cochlear implanted children, in sign and spoken language expression. For example, carpenter – *strong – wood*; baker – *I eat, stove, bread*; seamstress – *woman-shirt; mom learns trousers;* teacher (female) – *aunt 5 + 5*; writer – *girl looks at a computer*; fireman – *sss, shhh, water*; carpenter – *dad – rrr*; fireman – *dangerous, dad, fire, water*; policeman – *prison dad*; singer (female) – *aaa-grandmother*; baker – *has lunch, fish, dad*; goldsmith – eye hurts; cook (male) – *uncle beans*; actress-*monkey.*

Testing the adopting of sign and spoken language in an extensive longitudinal study that included 110 deaf children, whose parents are deaf, and their origins are from 16 different states in the US, indicates that deaf children learn sign language in a natural environment, in the same way as normal hearing children learn spoken language (Anderson & Reilly, 2002).

The study was not focused only on the number of words (signs) that deaf children acquire at a certain age, but also on the contents of these words.

The first sign vocabulary of deaf children and spoken vocabulary of children with normal hearing are characterized by the use of nouns, especially names of people, animals and food. It is specific that in normal hearing children onomatopoeia (sounds which mimic animals, vehicles or certain actions such as feeding and sleeping) appears, which is not characteristical for the vocabulary of growing children who are deaf (Anderson, 2006).

Nouns are generally easier to learn than verbs (Bornstein & Cote, 2005). Nouns tend to occur before the verb and to dominate early in children's spoken vocabulary of English (McDonough et al., 2011).

Although in some deaf children of hearing parents the first word appears at the same age as in normal hearing children, when it comes to expanding their vocabulary, deaf children lag behind their normal hearing peers (Easterbrooks & Baker, 2002).

Children of orderly development learn vocabulary indirectly as well as directly (Armbruster, Lehr & Osborn, 2003). Most of the vocabulary knowledge is acquired indirectly, through everyday interactions with grown-ups, siblings and peers through everyday conversations, games, verses, songs and reading (Burns, Griffin & Snow, 1999; Landry & Smith, 2006).

Work on enriching children's vocabulary includes determining the quantity and quality of every child's vocabulary in terms of its linguistic status – development. Enriching of children's vocabulary represents expanding children's experience and development of their opinions which we form in speech and sign (gesture) (Kovačević, 2005; Kovačević, 2013).

Numerous studies indicate that the vocabulary of children who are deaf and hard of hearing is quantitatively reduced in comparison with that of their normal hearing peers. Deaf and hard of hearing children form vocabulary later and learn new words more slowly (Coppens et al., 2010; Cole & Flexer, 2007; Easterbrooks & Estes, 2007; Lederberg, 2003; Lederberg & Spencer, 2001; Montgomery, 2007; Marschark & Wauters, 2008; Paul, 2009; Rose, McAnally & Quigley, 2004; Schirmer, 2000; Trezek, Wang & Paul, 2010, according to Luckner & Cooke, 2010).

In developing a child's vocabulary, an important place is held not only by developing the child's ability to understand, but also to actively use an ever larger and larger number of words.

CONCLUSION

The results obtained in preschool children, point out that the number of used words is different in each of the five surveyed areas.

Deaf and hearing impaired children of preschool age used, on average, a larger number of signs (gestures) than spoken words. The active vocabulary obtained through sign mode of expression is the most advanced. Sign vocabulary is the vocabulary in use, which deaf and hearing impaired children of preschool age use in their everyday communication.

Certain differences are evident in certain lexical fields, in relation to the total number of words and different ways of expression in preschool children.

Within sign and spoken forms of expression, children achieved the best results within the *Food and drink* lexical field, and the worst in the *Professions* lexical field.

Deaf and hard of hearing children adopted and produced best the numerous nouns that signify food and drink, and rarely used nouns that signify people's professions.

Through qualitative analysis within the five lexical fields: *Family, Food and Drink, Professions, Travels and House*, in deaf and hard of hearing children of preschool age, the most frequently used terms were obtained, as well as specific and inadequate answers (depending on how children perceived images).

Some lexical particularities of each lexical field were observed: certain terms were given only in sign-gesture; some children with cochlear implants named terms through sign – gesture with onomatopoeia or pronunciation of sentences; some children perceived notions wrongly.

Sign language expression in preschool children is more developed and with more content in comparison to spoken expression. The level of development of sign and spoken language expression depends on linguistic experience, the time that passed from the beginning of amplification, individual treatment, length of stay and participation of children in spontaneous and directed activities carried out in the preschool group, as well as methods used in working with children.

It is necessary primarily to show a deaf child how a particular word is used in speech and make reference to its daily use in speech, because that is the first level of getting to know words.

Mastery of a particular word, notion, by the deaf child, means its practical use in active speech, i.e. its use in everyday life, itsuse in precisely the appropriate situations, ease of its frequent use.

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DETERMENING THE FACTORS THAT AFFECT DEAF AND HARD OF HEARING PERSONS INDENTITY[a]

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SUMMARY

Today, there are two main perspectives from which deafness and deaf people are perceived. First, physiological (medical) view is predominant and deafness is perceived as disability, so the child with hearing impairment who steps out of ordinary, has to learn how to speak, how to hear as better as it can (with some types of hearing aid) and has to accomplish interaction and communication with the hearing population. Second, socio-cultural view sees deaf people as part of cultural, lingual and ethnic minority. In this context identity development of deaf people is very complex and longterm process which is studied by many scientists around the world. Reviewing the research it was determined that there are lots of factors which affect the identity development of deaf and hard of hearing people, such as the hearing status (when was the hearing impairment, the degree of hearing impairment and early intervention), family environment, educational experience, the mode of communication etc. The hearing screening is the first step of diagnosis of hearing impairment which positively contributes parents adjustments to newly created situation. Scientists have determined that alongside compulsory implementation of newborn hearing screening, 50% of children doesn`t get the timely diagnosis and early intervention. Deaf children are 90-92% born in hearing families. Deaf children with hearing parents that communicate verbaly or orally with each other, are likely to experience deafness as a disability and will develop cultural identity of the hearing population and vice versa. Deaf children born in deaf family will use sign language and will develop cultural identity of ethnic minority and deaf people. However, between this two angles there can develop many different models and ways of identity development of deaf persons which will be considered in details. Next major factor in identity development of deaf persons is educational experience. Most of the researchers point that the type of the school which deaf person attends (regular or special) dominant way of communication (verbal language, sign language, total communication) teacher attitudes to deafness and the acceptance of hearing peers, significantly affect identity development of deaf people.

Key words: factors, identity development, deaf and hard of hearing

INTRODUCTION

Identification is a psychological process from which the person relates to other person or group it admires.

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That is the basic condition for successful socialisation of the child. Role models for identification can exist at any age. According to Ericcson there are three main meanings of identification: 1. As imitation 2. As a feeling of continuity in space and time and 3. As ego-identity which in itself gathers two firs meanings, but it also exceeds them (according to Brinthpaut, 2008). Identity represents connection between psychological and behavioral answer of the individual in context of society. Mcilroy and Storbeck (2010, p. 494) consider that identity "is based on that how the children internalize experiences within family and school".

Yinger (1976) stresses that ethnical identity of member of ethnical manority group is being determined on the basis of identification with "segments of the majority group, with itself or others, to have common origin and that they share segments of common culture and are involved in common activities which are important component of that culture" (as cited in Chavez & Guido-DiBrito, 1999, p. 41).

Because the ethnical identity is very subjective feeling, even inside one ethnical group there can be many variations. As a result of that, common history, cultural customs, skin colour or language, secluded ethnical identity doesn'talways have to define ethnical identity (Leigh, 2012; Rodriquez & Santiviago, 1991; Bennett, 1988). As ethnical identity, the identity of deaf people is subjective and can give the feeling of affiliation to members of the group. Lane, Pillard and Hedberg (2011) have noticed that the feeling of affiliation in Deaf culture can be strong as family bonds and can offer the sense of solidarity inside the Deaf community. What more, even as the hearing culture, the culture of the Deaf has important variations between its members (Fischer & McWhirter, 2001). The development of the identity of the Deaf national manority can depend on the feeling that the individual has inside that manority (culture).

Two main perspectives of deaf people

There are two main perspectives from which deaf person is being watched on. First, physiological or medical perspective is predominant and it experience deafness as disorder, by that means the hearing impaired child departs from normal, has to learn how to speak, how to hear better with the help of hearing aids and how to accomplish interaction and communication with the hearing population. Second, socio-cultural perspective sees deaf people as a part of cultural, lingual and ethnical manority (van Cleve & Crouch, 1989; Parasnis, 1997; Parks, 2009).

Within the dominant culture of the hearing, deafness is through history being determined on medical/pathological model. The identity of the deaf is often defined as a disability and something atypical (Bauman, 2005). As a result of that, the sense of marginalization and inferiority is implemented within the manority culture of the Deaf. McIlroy and Storneck (2010) consider that the individual that was cultured as a deaf person automatically had "the identity of the second class" (p.495).

Through the eighties, cultural movement of the Deaf was starting to get more zest, basically it chested through for the rights and dignity of deaf and hard of hearing people, within the hearing population. There has been the shift in the education of the deaff and development in socio-cultural models of deaf people who were being identified as a manority group that has its own language, values, historical framework of development, art and culture (Parasnis, 1997; Radić-Šestić, Ostojić, Đoković, 2015). In that context, notion of the Deaf culture is being expirienced as cultural community which infuenced scientists view and interest in the Deaf culture, the development of the identity of deaf, as well as the theories which are related to identity development and similar concepts in relation to cultural identity of the deaf. The advocates of deafness as a culture besides the term culture, allways alleg capitol letter D-Deaf, while the small letter "d" indicates deafness as a patology (Dolnick, 1993).

Acculturation and paradigms of identity

Notion acculturation was evolved from prefix *ad*, which should mark that the occuring chages in process of acculturation are such character that they are not being accomplished sudden and instant as other current laws, but, on the contrary they are being accomplished in a relative long period of time. The second part of the notion is derived from latin word *cultus* which in serbian language has more than one meaning: cultivation, care, growing, education and upbringing. These processes are not the thing of the moment, they are not acts, they are duration.

Acculturation and identity are two very similar notions, but they are not sinonims for aspect of human development. On the one side, acculturation can represent behavioral answer of the individual to exposure of some new culture or cultures (Leigh, 2010). For deaf person, acculturation in new culture of the Deaf usually begins in school age (Maxwell-McCaw & Zea, 2011). Acculturation – entrance to the culture of the Deaf, canallow deaf individual "to acquire and maintain aspects of the culture of the Deaf, while in the same time acquires and maintains aspects of the predominant hearing culture" (Maxwell-McCaw & Zea, 2010, p. 338).

On the other side, identity can be defined as a psychological process in which individual identifies itself (Brinthaupt, 2008) and has a feeling of affiliation to one social group (Leigh, 2012; Triandis, 1989; Teylor, 1999). Identity is interaction between the individual and other people during life (McCaw, Leigh & Marcus, 2011). As a result of that, some researchers claim that the identity is not the statical intern aspect of human development – as a chronologycal age – but it is how it is seen or representing itself (Leigh, Marcus, Dobosh & Allen, 1998: Gutierrez & Rogoff, 2003), but it develops under the influence of the environment and in relation to other people (Hintermair, 2007; Taylor 1999).

Because of that acculturation and identity represent the connection between psychological and behavioral anwser of the individual in the context of society. Berry, Kim, Minde and Mok (1987) have given four proposals to category of acculturation:

Integration – when the individual respects its culture, but in the same time they include the aspects of the dominant culture. This is often called biculturalism;

Asymilation – when the individual waives off its original/authentic culture and accepts dominant culture as its own;

Separation – when the individual accepts its own culture and are withdrawing themselves from dominant culture;

Marginalisation – when the individual doesnt identify nor with its own or the dominant culture.

Diversity of deaf identity

The first researcher who was interested in identity development of the deaf is Glickman (1993). Firstly, he formulised the identity problem and developted the Scale for identity assessment of the deaf. On the basis of first research he identified four development phases of the identity of the deaf: 1. "Culturaly hearing" are the deaf people who have the attitudes of the dominant hearing culture and see themselves as a persons that have hearing impairement; 2. "Culturaly marginal" are not sure to which group they belong and have a confusion in relation to the world of the deaf and the hearing; 3. "Imersion identity" are relating ro "radical or militant" attitudes of the deaf; 4. "Bicultural identity" is related to the individual who are proud deaf persons integrated in a balanced way and in the hearing society.

On the foundations of Glickmans theory of identity development of the deaf, Holcomb (1997) have created seven categories of identity of the deaf persons who are based on the level of exposure of the individual to the deaf community:

Balanced bicultural identity refers to a deaf person who is feeling pleasant in both cultures, cultures of the deaf and the hearing;

Dominantly deaf bicultural identity relates to the people who are mainly involved in the deaf community, but they are also in good relations to the hearing persons;

Dominant-hearing bicultural identity refers to the people who have restricted involvness in the deaf community, but are feeling good in the company of the deaff persons;

Culturaly isolated identity refers to the people who reject all connections with the deaf people;

Culturaly individual identity refers to the people who prefer to communicate with deaf people as long as possible but maintain contacts with the hearing population on minimum;

Culturaly marginal identity refers to the people who are not feeling well in any community, nor the deaf nor the hearing;

Culturaly closed identity refers to deaf persons who didnt have a chance to meet other deaf persons and culture of the Deaf.

Bat-Chava (2000) is on the basis of the claster analysis defined tree identities on the sample of 267 adult deaf persons. He called them cultural identity of the hearing, cultural identity of the deaf and the bicultural identity.

Although the Glickman, Holcomb and Bat-Hava have developted different callisifications of the identity of the deaf, they have similar idea about their phases of development (Maxwell-McCaw, Leigh & Marcus, 2000). Most of the deaf people (90-92%) are born in hearing families in whome they communicate and educate by verbal and oral language. There si a presense of deniel of deafness, sign language and the style of deaf people living. Then the deaf person in relation to surroundings in which it coexsists identifies with the culture of the hearing. With the development of self-consciousness, especially after meeting and socializing with other deaf persons, the individual by time starts to understand that it cant communicate the same with the hearing people as it can with the deaf and then its identity becomes dissonant. With more frequant contact with the Deaf community, it expiriences affirmation; changes identity introspecticly and becomes aware of the difference between the hearing culture and the Deaf culture. That would mean that the deaf persons who are born in hearing families go through four phases of identity development: 1. Identification with the hearing culture 2. Due to the problems in identification of the individual, the identity is negative 3. Because of the easier communication with the community of the Deaf, identity of the deaf develops. 4 Bicultural identity (Chen, 2014).

Factors of deaf identity development

The identity development of the deaf persons is very complex and long term process which is being researched by many scientists around the world. Reviewing the research it was determined that there are lots of factors which affect the indentity development of deaf and hard of hearing people, such as the hearing status (when was the hearing impairment, the degree of hearing impairement and early intervention), family environment, educational expirience and academic achievement, the mode of communication etc.

The status of hearing loss

It is considered that the status of heaing loss, apropos the time hearing impairement (prelingual or lingual period) degree of hearing imapirement and early intervention affect the identity development of the deaf and hard of hearing persons (Fischer & McWhirter, 2001; Hu, 2005).

Per 1000 newborns 3 babies have hearing demage (Kurtzer-White and Lutterman, 2003). Over 90 percent of deaf children are born in hearing families who have little or no knowledge about theire disability. Screaning of the hearing is the first step to diagnose hearing impairement and it positively contributes the adjustment of the parents to the newly created situation. In addition to screaning implementation of the hearing, it estimates that 50% of newborns doesnt get the timely diagnosis and intervention (Houston, Bradham & Guigard, 2011). Different factors can delay timely diagnosis as an absense of the testing of the newborn before it leaves the hospital, when tests give fake positive result or the testing is not been monitored by qualified personel. Marschark (2007) highlights that the hearing impairement of children is not diagnosed by their second or third year because of the shortcomings of the hearing screaning.

Possible significant delay with the start of early intervention and experts support, thus entailing the delay in determining the hearing aid and the development of language for a child after being diagnosed (Proctor, Neimeyer & Compton, 2005). Programs of early intervention educate the family, provide adequate material resurses and support that helps them make a decision based on the best interes for their child (Marachark, 2007).

Table 1 *The three major types of Early Intervention programs**

Auditory–verbal / Oral-aural	Total Communication	Bilingual / Bicultural
Focuses on the use of even minimal amounts of amplified hearing to develop spontaneous speech and to process language in a natural way through auditory pathways. These programs aim to enable children with hearing impairment to learn to listen, understand spoken language and communicate through speech using their residual hearing, and in the oral-aural approach, using lip-reading as well. These programs usually place the parent in the role of primary educator.	Focuses on the use of a wide range of methods of communication including speech, lip-reading, listening, signing and finger spelling. These various methods of communication may be used alone or in combination with each other. When speech and signing are used together this is known as simultaneous communication.	Focuses on education through two languages"Signing and spoken language. Spocen language is taught as a second language via reading and writing or through sign systems representing, and speech. In many educational programs and school settings, children who are deaf or hearing-impaired may learn about the deaf community and its history, language and culture, as well as learning about the hearing community.

*Australian Government (2005)

Fischer and McWhrirter (2001) have researched the connection between degree of hearing impairement and cultural identity and have found out that prelingual deaf persons are more identified with the culture of the deaf, while hard of hearing persons, especially if the hearing damage happened in prelingual period, more often accept culture of the hearing then persons who have became deaf in prelingual period. Authors have concluded that the time of occurance and degree of hearing loss affect the identity development with these group of people. Parks (2009) highlights that the degree of hearing loss and hearing status of the parents are the factors that affect the choice of communication. On the basis of the results of research Thumann-Prezioso (2005), the degree of hearing loss can indirectly affect the identity development of deaf and hard of hearing persons. Respectively, time when the hearing loss begun and the degree of hearing loss indicate more on physical status, but very importan role have social and cultural environment of the individual (Thumann-Prezioso, 2005).

The enviroment of family

Bronfenbrenner and Ericsson (1980) have noted that there is strong connection between identity development and social expectations of the individual. This expectations dictate how the individual behaves and on what way he/she will be integrated in broader social environment. Family is the first institution that sets social expectations towards the individual, so that the identity is developted on the basis of connecting the experiences, future expectations and social interactions with broader social environments. Researchers (Leigh et al., 1998; Eckert, 2010) have supported the argument that the family and the education system have stron influence on identity development, additionally highlighting that the identity of the individual is "depended on the context of environments" (Markus and Kitayama, 1991, p. 225).

Leigh et al. (1998) have researched how hearing adults and deaf persons identify themshelves and have found out that the experience of being deaf/hard of hearing with hearing adults affects identity development in a way that is different to identity development of hearing or deaf/hard of hearinf person that has deaf parents. Hadjikakou (2011) sets and example of the individual by the name *John* who developted an identity of a daf person. As a child, he first had an identity of a hearing person, after that cultural marginal identity because he has deaf but speaking father and hearing mother who didnt know sign communication. They have enrolled John in regular primary school in which he didnt have any conctacs with deaf persons and he only communicated orally (by speaking) with his environment. Back then he didnt feel good being deaf.

Other research state that some parents think that a deaf child shouldnt go to school because of its disability, so it doesnt need an education (Chen, 2011). Behavior of this type of parents affects negatively on development of deaf children. Generally, deaf children are on the strong influence from the members of the family with whome it identifies. Many hearing, even deaf, parents can build family atmosphere in which deafness is perceived as a disability and in which use of sign language is forbidden. This type of view parents transfer to their deaf children. In contrast of that, deaf children whose parents/or brothers or sisters are members of the Deaf community will most probabely be exposed to cultural model of deafness through interaction with the family and the Deaf community.

Educational experience

Next vital factor in identity development of deaf persons is educational experience. Most researchers who have been interested in this area point out that the type of the school deaf person attends (regular or special) dominant way of communication (verbal language, sign language, total communication), attitudes of the theacher towards deafness and acceptance from hearing peers significantly affects identity development of deaf person (Bat-Chava, 2000; Rose, 2001; Zhang & Wang, 2009; Hu, 2005; 2005; Nikolaraize & Hadjikakou, 2006, 2007). Today, there are 4 different schooling options which are available to deaf and hard of hearing children: 1. Special departments of the reagular schools 2. Mainstream or inclusive regular schools 3. Residental or boarding schools 4. Daily special schools for deaf children inside the school system. Mainstream (inclusive) option allows deaf children to attend school with the hearing peers, with or without the support of the special educator-rehabilitator. Special departments are special sections in school for typical children in which they attend teaching and the children with development disabilities. In contrary to mainstream schools, hard of hearing pupils in residental schools attend classes in school in which there are only hard of hearing pupils, and they live in boarding school because the family home is far away from the school. And in the end, daily schools for deaf pupils are similar to residental schools because it is attended only by hard of hearing pupils, but on the contrary to residental school they dont live in bouarding school but with the their families.

Many research prove that the school experience affects identity development of the deaf children, Nikolaraizi and Hadjikakou (2006) have found out that the teachers in mainstream schools often consider that the hard of hearing children have difficulties learning. It is noted that deaf pupils in their surroundings have the feeling of isolation and lonelyness. This findings is supported from other researchers who estimated that the deaf children feel alienated in mainstream schools (Leigh, Maxwell-McCaw, Bat-Chava & Christiansen, 2008). On the contrary, Leigh et al. (2008) have concluded that the pupils who are educated in boarding schools have more confidence and more positive identity development then pupils who are being educated in mainstream environments.

The research from Cole and Edelmann (1991) points that the teachers in mainstream schools promote mostly hearing identity (they encourage verbal/oral communication instead of using sign language) which can negatively affect identity development of the deaf pupils. Hearing teachers describe deaf pupils as individuals who have psychological problems and behaviour problems in greater extent then the pupils alone. Factors that affect the way deaf individual identifies himself (as a hearing or deaf person) depends on the parents, teachers and peers views towards deafness which by nature are very complex.

Bat-Chava (2000) have on the sample of 267 deaf adults confirmed that the respondents have attended special or residental schools have developted cultural identity od the deaf and that after finishing school have easily been integrated in Deaf community. In contrast, the ones wholly included in hearing environments didnt meet other deaf pupils and adults, so they didnt become the part of the Deaf community even in adulthood.

Chinese scientists Zhang and Wang (2009) think that deaf children who have accepted verbal/oral education easilly develope cultural identity of the hearing or marginal identity, in contrast to that, deaf children who have accepted sign language more often identify themshelves with the culture of the Deaf or have bicultural identity.

Factors influencing academic achievement

The results of the research which have been conducted in the seventies and eighties point that children with deaf parents achieve better academic success then children with the hearing parents. This results suggest that deaf children with hearing parents too can have benefits from using sign language. However, this explenation has been disputed because not every deaf parents use sign language in communication with their children (Jensema & Trybus, 1978). Big number of other factors can influence academic achievement of deaf children. First factor is the reason for hearing loss: deafness in kids with deaf parents is often inherited, while deafness on kids with hearing parents can be effect of many factors, some of which affect strongly development in many areas of child development Jensema & Mullins, 1974). Second factor is that deaf parents easier accept hearing damage of their children and that do it better then the hearing parents (Corson, 1973, as citied in Quigley & Paul, 1986). Third factor is that better paralinguistical skills which are needed later in life for language development can provide deaf then hearing parents more.

Shortly, although research point out on better academic achievements of deaf pupils of deaf parents relative to deaf pupils with hearing parents, samples are not clrear. It is determined that deaf children of deaf parents have bigger selfestime and show better developted lingual capabilities then deaf children with hearing parents, which is often attributed to better understanding of deafness by deaf parents then the hearing parents (Koelle & Convey, 1982).

Ritter-Brinton (1993) have found out that two most frequantly citied factors which are connected to academic achievement of deaf pupils are *parents expetations* and *communication fluency at home*. Hearing status of the parents was not the main factor in academic achievement of deaf children. In studies from year 1986, on the basis of interview of parents with deaf children which had a goal to identify families psychosocial factors which are related to high academic achievements of deaf children, Bodner-Johnson has determined two factors. First is called *adatation to deafness*, which implies acceptance of the deaf child and positive orientation towards the Deaf community. Second factor is called *imposing achievements*, and it is related to high education and professional expetation of the deaf child (as cited in Powers, 2003).

Reed et al. (2008) alleges that succesfull deaf and hard of hearing pupils have support of the family, peers and school, the unseccesfull pupils have couple of reliefs and lack of support (as cited in Radić-Šestić, 2013).

The mode of communication

Although about the way of communication of deaf persons was within the curriculum in studies about family environments and educational experience, many scientists (Sutton-Spence, 2010; Nikolaraize & Hadjikakou, 2006; Kossewska, 2008; Sheridan, 2010) still research how the way of communication as a independent factor affects identity development of the deaf. Deaf persons usually use one or ways of commucating or both, sign language and/or verbal/oral language. The use of specific way of communication and attitude of deaf person towards another language affects identity development of that person.

In his doctoral thesis Hole (2004) has followed the experience influence of individual from childhood in gaining linguistic skills (verbal/oral or sign language) on identity development. She found out that participants who are experiencing themshelves the oral type, more frequantly have feeling of shame, isolation, alienation, constriction and depression then participants who have been brought up using sign language.

Sutton-Spens (2010) have analyzed interviews with british teachers who are deaf and other adult deaf persons who have talked with children using sign language. He has concluded that the participants are proud of their deafness, and point out the value of sign language and importance of Deaf community.

Meanwhile, Nikolaraize and Hadjikakou (2006) have followed the influence of educational experiences on identity development of the deaf and have found out that participants with deaf person identity consider that the sign language allows them more efficient communication.

Kossevka (2008) states that dominant way of communication is related to lingual competence. Lingual competence of deaf pupils should be understood as a part of socialization process for them and formating self-concept which is also relevant predictor of self-identity.

Potmesil and Valenta (2006) mention concept of total *communication* which can be defined as very liberal, eclectic and combined technique which consists of larger number of different methods of communication. Authors consider that in teaching it can be used as a combination of sign, whrite, mimic, talk, pictures or any other way of communication that eases mutual communication and understanding interviewee. Total communication could be easier and favorable then using just one type of communication (sign or oral) for development of deaf children, so they consider that in it there is big potencial for identity development of deaf persons. First, most of deaf children are born in hearing families whose members dont have a chance to get to know sign language and Deaf culture, exept if the child is attending school for the deaf or it becomes the part of the Deaf community. Second, many deaf people point out that they experience the world visually and through sign language. In that context, deafness is not a loss, but social, cultural and lingual identity. In both cases total communication is adequate fot identity development of the deaf and hard of hearing child.

CONCLUSION

Factors that affect identity development of deaf and hard of hearing persons are being researched from decades ago. Identity development is very complex and dinamic process which develops during the life of the individual. The influence of the environments and relations with other people in process of identity development reflects differently on deaf and hard of hearing person and it can go through many development phases of identity (exmp. Hearing cultural identity, deaf cultural identity, bicultural identity). Through which phases will it go by and on what phase of identity development will deaf and hard of hearing person stop, depends on number of factors.

Many years of research point out that there are lots of factors which affect the identity development of deaf and hard of hearing people, such as hearing status (when was the hearing impairement, the degree of hearing impairement and early intervention), family environment, educational expirience and academic achievement, the mode of communication etc.

Although it is proven that listed factors in smaller or bigger way affect identity development of deaf and hard of hearing persons, there by the discussion on this subject is not finished. First, it is noticed that the affect of certain factors are in mutually interwoven and it is not clear which and to what extent affects identity development od deaf and hard of hearing persons. Second, perspective from wich deafness is being percived is changeing constantly with the society development, so thus the approach to deafness changes also. If we observe identity as psychosocial dimension, it is certain that it follows the society changes which should be permanently researched. New research can cristalize new factors that affect identity development of deaf and hard of hearing subpopulation.

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PRECONDITIONS OF MATHEMATICS KNOWLEDGE AND SKILLS[a]

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SUMMARY

The main aim of this research is to determine developmental abilities that are preconditions of acquiring mathematics knowledge and skills.

The sample consisted of 115 typically developing children of both genders, aged between 8 and 11 (M=9.78). Acadia test of developmental abilities was applied to assess the abilities that are considered necessary for acquiring academic knowledge and skills. Achievements in different areas of Mathematics were assessed on the basis of teachers' questionnaire based on General achievement standards.

The results of this research reveal a statistically significant influence of various developmental abilities, assessed by means of Acadia test, on achievements in different areas of Mathematics, presented through total scores: visuomotor skills ($p \leq 0.000$-0.003), perceptive functions ($p=0.033$-0.018), language skills ($p=0.004$-0.020), verbal and nonverbal reasoning ($p=0.002$; $p=0.023$) and auditory short-term memory ($p=0.015$).

Children with lower scores on Visuomotor Coordination and Sequencing subtest (below 25th percentile) had significantly lower achievement in all mathematics areas ($p \leq 0.000$-0.039). Children with lower scores on Visual Discrimination subtest had significantly lower achievement in the area of multiplication and division ($p=0.003$-0.010), geometry ($p=0.002$-0.036) and measurements and measures ($p=0.009$-0.016). Lower copying skills (below 25th percentile) were related to lower addition and subtraction achievements ($p=0.012$-0.046), while lower scores on Auditory Memory subtest were related to lower knowledge of integers ($p=0.017$-0.029). Children with lower scores on Concept Formation subtest had lower achievements in the areas of addition and subtraction ($p=0.009$-0.011), multiplication and division ($p=0.002$), geometry ($p=0.017$-0.045) and measurements and measures ($p=0.013$-0.009).

The results obtained in this study indicate that among numerous developmental abilities, visuomotor coordination, visual discrimination, copying skills, verbal reasoning and auditory short-term memory can be singled out as areas of great importance for the development of various aspects of mathematics. Thus, in the context of prevention and early intervention, it would be desirable to focus more on the development of visuomotor and integrative skills at the preschool level.

Key words: developmental abilities, mathematics, Acadia test

INTRODUCTION

Mathematics is one of the basic academic fields which includes different aspects such as arithmetic, geometry, algebra, etc. Their acquisition depends on numerous factors of different origin, some of which are intelligence, motivation, self-confidence in mathematics, anxiety related to mathematics, and different cognitive skills (specific and general) (Geary, 2011; Gligorović, 2010).

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Low achievement in mathematics is a serious problem since mathematics skills are a very significant element of adaptive skills, especially in industrially and technologically developed areas. Numerical data are present in all aspects of everyday life – e.g. in assessing the time needed to get from one part of town to another, making financial decisions, paying bills, estimating how many people are in a room or how much food should be prepared for a certain number of guests.

According to the results of some studies on mathematics skills in elementary school children, about 21% of eleven-year olds fail to master the appropriate mathematics syllabus, while 5% fail to master the skills appropriate to the age of 7. These difficulties tend to persist to adulthood. It is estimated that basic numerical skills necessary for everyday situations are not developed in as many as one fifth of adults (Cragg & Gilmore, 2014), which greatly influences the choice and possibility of permanent employment. These people are usually limited to manual and low-wage jobs (Dowker, 2005). Apart from difficulties in various aspects of mathematics, poor reading skills also reduce employment possibilities and influence wage levels. However, poor mathematics skills proved to have a greater negative influence on professional life, even in persons with good reading skills (Parsons & Bynner, 1997).

A meta-analysis of longitudinal studies on a sample including over 34000 schoolchildren, determined that mathematics skills at the preschool level (especially numbers and ordinality) were the best predictors of future general academic achievement. It turned out that early mathematics knowledge was a better predictor of future success than early literacy, attention, socio-emotional functioning and intelligence (Duncan et al., 2007).

Individual differences in the level of acquired mathematics knowledge and skills are common. However, these differences are in certain cases so pronounced that they can be characterized as a problem or a difficulty (Geary, 2004). It is believed that between 3% and 6% of children express difficulties in mathematics to the extent that classifies them as children with dyscalculia (Dowker, 2005; Fuchs et al., 2005; Shalev et al., 2000). Apart from that, about 10% of children continuously achieve poor results in mathematics (the so-called low achievers). Both groups of children have difficulties in understanding and representing quantity, remembering basic arithmetic facts and acquiring mathematical procedures which cannot be explained by lower intellectual achievement (Geary, 2011).

The 10th percentile on standardized achievement tests is usually applied in research as a boundary which establishes the difference between low achievers and children with dyscalculia. Children whose mathematics achievements are below the 10th percentile for two consecutive school years are usually classified as children with dyscalculia, while those whose achievements are between 11th and 25th percentile are classified as low achievers (Chong & Siegel, 2008; Geary, 2011; Sigmundsson, Anholt & Talcott, 2011). Apart from this criterion, some researchers also use somewhat stricter boundaries in defining a specific difficulty in mathematics, which is usually 15th or 20th percentile (Reigosa-Crespo et al., 2012; Rubinsten & Sury, 2011; Shalev et al., 2000).

Difficulties in mathematics may be expressed in different ways. They are most frequently manifested as difficulties in recognizing symbols, mirror writing of numbers, difficulties in recognizing basic mathematical operations, acquiring and remembering mathematical facts, solving contextual tasks, etc. (Neumärker, 2000).

When dyscalculia or severe difficulties in mathematics are concerned, a frame of reference usually consists of average intellectual abilities and the absence of sensory impairments and emotional problems, with the emphasis on unexpected low achievement with regard to child's abilities and learning opportunities. However, unexpected low achievements in mathematics are also related to several developmental disabilities, such as phenylketonuria (Antshel, 2010), spina bifida (English et al., 2009), Turner syndrome (Mazzocco, 2009), Williams syndrome (O'Hearn & Luna, 2009), and Fragile X syndrome (Murphy, 2009). The results of these studies indicate the presence of specific cognitive profiles which are considered the basis of their difficulties in different aspects of mathematics, regardless of the level of intellectual functioning. Typical development represents a good landmark in determining the characteristics of different developmental disabilities. Similarly, the results of studies performed on clinical population may provide a new insight into the predictors of mathematics knowledge and skills in typically developing population, and the presence of learning disabilities.

In our previous research, it was determined that achievements in different areas of mathematics had a significant and relatively high correlation ($r=0.41-0.50$) with children's developmental status, assessed by means of Acadia test (Gligorović & Buha, 2015). Children whose general score on Acadia test was in the lowest range (below 25th percentile) also had significantly lower achievements in all the assessed areas of mathematics (knowledge of integers, basic arithmetic operations, geometry, measurements and measures) ($p\leq0.000-0.05$).

With regard to the fact that mathematics skills, as a complex system, are based on the functioning of different cognitive abilities, the aim of this research was to expand the information obtained in our previous research (Gligorović & Buha, 2015), and to determine the developmental abilities which are preconditions of acquiring mathematics knowledge and skills.

METHOD

The sample consisted of 115 typically developing children of both genders (60/52.2% girls and 55/47.8% boys), aged between 8 and 11 ($M=9.78$; $SD=0.59$), attending 3rd and 4th grade of elementary school. Boys and girls were equal with regard to age ($F_{(1)}=1.781$, $p=0.185$). In accordance with the selection criterion, children with below-average intelligence were not included in the sample.

Instruments and procedure

Acadia test of developmental abilities (Atkinson, Johnston & Lindsay, 1972) was used to assess the abilities necessary for acquiring academic knowledge and skills. The test was developed with the aim to determine the cause of learning failure in schoolchildren, and it was translated and adapted in Croatia in 1985 (Novosel & Marvin Cavor, 1985). It was further adapted for Serbian language and standardized with regard to the achievements of younger schoolchildren in Serbia (Gligorović et al., 2005). The test consists of 13 subtests aimed at assessing the set of verbal and nonverbal abilities which are considered preconditions for acquiring academic knowledge and skills. It includes subtests which assess **perceptive functions** (Auditory Discrimination – Subtest 1, Visual Discrimination – Subtest 3, and Audio-Visual Association – Subtest 6), **memory** (Visual Memory – Subtest 5, and Auditory Memory – Subtest 8), **visuospatial** and **visuoconstructive abilities** (Visuomotor Coordination and Sequencing – Subtest 2, Drawing Shapes – Subtest 4, and Drawing – Subtest 13), **language skills** (Acquired Language Treasure – Subtest 10, and Automatic Language Treasure – Subtest 11), and **reasoning** (Concept Formation – Subtest 9, Sequence and Coding – Subtest 7, and Visual Association – Subtest 12).

Achievements in the areas of Mathematics were assessed on the basis of teachers' questionnaire based on General achievement standards for the end of the first education cycle. Teachers' assessment of achievements in mathematics included integers, addition and subtraction, multiplication and division, geometry, and measurements and measures. Teachers were asked to evaluate every child's level of knowledge/skill (expected for the child's grade or at the level of a previous grade). If they considered that a child's achievements met the requirements, teachers were asked to determine the precise level (elementary, intermediate, or advanced) and assess to what extent the child mastered the knowledge and skills appropriate for the given level (1 minimally, 2 partly, 3 completely). Each of the Mathematics areas could be awarded the maximum of 10 points. General score of teachers' assessment of students' achievements was obtained by summing up the results of the assessed areas (inter-correlation of the areas ranges from 0.84 to 0.92).

RESEARCH RESULTS

According to the results of our previous research on the same sample, the mean values of most teachers' questionnaire scores, based on General achievement standards, as well as the total scores in Mathematics (AM=36.23, SD=9.542) were grouped towards intermediate and higher levels of mastered knowledge and skills. There was no statistically significant influence of age and gender (p>0.05) on the results of the questionnaire (Gligorović & Buha, 2015).

The results of the participants on Acadia test subtests are shown in Table 1.

Table 1 *Basic statistical characteristics of students' achievements on Acadia test subtests*

	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	A11	A12	A13
Min	22	25	36	22	24	12	20	23	32	24	33	35	7
Max	61	63	60	62	63	67	67	71	73	68	65	71	66
M	55.10	45.30	52.79	41.57	51.6	50.93	54.61	46.76	54.96	56.91	55.97	58.17	40.37
SD	5.43	9.10	5.14	9.26	7.17	8.07	8.70	10.43	8.17	7.73	6.07	8.66	11.80

With regard to the percentile ranks of the results on Acadia test subtests, the sample was divided into three groups for each subtest, where the first group consisted of the participants with the lowest scores (up to 25th percentile), the second group consisted of the participants with average scores (25th-75th percentile), and the third group consisted of the most successful participants (above 75th percentile) (detailed in Table 2).

Table 2 *Sample distribution with regard to percentile ranks of achievements on Acadia test subtests*

	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	A11	A12	A13
PR	n(%)	n(%)	n(%)	n(%)	n(%)	n(%)	n(%)	n(%)	n(%)	n(%)	n(%)	n(%)	n(%)
≤ 25	50 (43.5)	29 (25.2)	36 (31.3)	31 (27.0)	38 (33.0)	45 (39.1)	32 (27.8)	29 (25.2)	36 (31.3)	35 (30.4)	37 (32.2)	32 (27.8)	29 (25.2)
25-75	37 (32.2)	65 (56.5)	66 (57.4)	59 (51.3)	58 (50.4)	53 (46.1)	55 (47.8)	60 (52.2)	62 (53.9)	74 (64.3)	54 (47.0)	64 (55.7)	62 (53.9)
≥ 75	28 (24.3)	21 (18.3)	13 (11.3)	25 (21.7)	19 (16.5)	17 (14.8)	28 (24.3)	26 (22.6)	17 (14.8)	6 (5.2)	24 (20.9)	19 (16.5)	24 (20.9)

PR – percentile rank

A significant correlation was determined between achievements on Acadia test subtests and the assessed areas of mathematics by applying Pearson correlation coefficient (Table 3). The overall achievement in mathematics (MS) had significant positive correlations with the results of all subtests (r=0.19-0.41) except Auditory Discrimination (A1) and Drawing (A13) (p>0.05), which, unlike other subtests, did not have a significant relation with the success in individual areas of mathematics. Visuomotor Coordination and Sequencing (A2), which had the highest correlation with the achievement in the area of measurements and measures (r=0.43), and Concept Formation (A9) which had the highest correlation with the achievement in arithmetic operations (r=0.42-0.46) are the subtests which were singled out as those with significant correlations with individual areas of mathematics.

Table 3 *Correlation of the results of Acadia test subtests and teachers' assessment of achievements in mathematics*

Acadia test		MATHEMATICS					
		I	AS	MD	G	MM	MS
A1	r	0.068	0.111	0.136	0.150	0.125	0,124
	p	0.478	0.245	0.155	0.117	0.192	0,194
A2	r	0.389	0.391	0.367	0.392	0.434	0,413
	p	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0,000**
A3	r	0.254	0.273	0.384	0.314	0.334	0,329
	p	**0.007**	**0.004**	**0.000**	**0.001**	**0.000**	**0,000**
A4	r	0.267	0.292	0.353	0.331	0.281	0,320
	p	**0.005**	**0.002**	**0.000**	**0.000**	**0.003**	**0,001**
A5	r	0.144	0.206	0.204	0.239	0.192	0,207
	p	0.132	**0.030**	**0.031**	**0.011**	**0.043**	**0,029**
A6	r	0.239	0.207	0.192	0.208	0.167	0,211
	p	**0.012**	**0.029**	**0.043**	**0.028**	0.079	**0,026**
A7	r	0.163	0.262	0.302	0.255	0.236	0,256
	p	0.088	**0.006**	**0.001**	**0.007**	**0.013**	**0,007**
A8	r	0.240	0.182	0.227	0.205	0.167	0,213
	p	**0.011**	0.056	**0.017**	**0.031**	0.079	**0,025**
A9	r	0.330	0.416	0.460	0.370	0.386	0,411
	p	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**
A10	r	0.323	0.285	0.351	0.337	0.291	0.332
	p	**0.001**	**0.002**	**0.000**	**0.000**	**0.002**	**0.000**
A11	r	0.358	0.375	0.382	0.340	0.341	0.375
	p	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**
A12	r	0.159	0.174	0.219	0.203	0.166	0.193
	p	0.096	0.067	**0.021**	**0.033**	0.081	**0.042**
A13	r	0.107	0.096	0.138	0.153	0.076	0.119
	p	0.264	0.317	0.148	0.109	0.429	0.212

I= Integers; AS= Addition and Subtraction; MD= Multiplication and Division; G= Geometry; MM= Measurements and Measures; MS= Mathematics-total score.

By applying Analysis of variance, it was determined that the results of most Acadia test subtests, expressed in percentile ranks, had a statistically significant influence on the success in mathematics in general and individual areas of mathematics (Tables 4-13). Achievements on the subtests Auditory Discrimination (A1: F(2)=0.467, p=0.628), Visual Memory (A5: F(2)=2.781, p=0.066), Visual Association (A12: F(2)=2.871, p=0.061), and Drawing (A13: F(2)=0.814, p=0.446) did not make significant differences to the success in mathematics in general. With the exception of the results of Visual Memory subtest (Table 7), the results of the mentioned subtests did not make significant differences to the achievement in individual areas of mathematics knowledge and skills (Auditory Discrimination: I – F(2)=1.088, p=0.358; AS – F(2)=0.872, p=0.458; MD – F(2)=0.683, p=0.564; G – F(2)=1.335, p=0.267; MM – F(2)=0.821, p=0.485; Visual Association: I – F(2)=2.539, p=0.084; AS – F(2)=2.764, p=0.068; MD – F(2)=2.962, p=0.056; G – F(2)=2.623, p=0.077; MM – F(2)=2.247, p=0.111; Drawing: I – F(2)=0.754, p=0.473; AS– F(2)=0.356, p=0.701; MD – F(2)=1.076, p=0.344; G – F(2)=1.283, p=0.281; MM – F(2)=0.654, p=0.522). The following segment presents statistically significant results.

Table 4 shows students' achievement in different areas of mathematics with regard to their results on Visuomotor Coordination and Sequencing subtest (A2).

Table 4 *Visuomotor Coordination and Sequencing (A2) and teacher's assessment of students' achievement in mathematics*

Mathematics	A2 score	AM	SD	F(2)	p
Integers	≤ 38	6.56^{ab}	2.063	11.066	**0.000**
	39 - 53	7.95^{a}	1.768		
	≥ 54	8.90^{b}	1.071		
Addition and Subtraction	≤ 38	6.74^{cb}	1.873	8.435	**0.000**
	39 - 53	7.84^{c}	1.766		
	≥ 54	8.80^{b}	1.322		
Multiplication and Division	≤ 38	6.30^{cb}	2.163	8.468	**0.000**
	39 - 53	7.45^{c}	2.023		
	≥ 54	8.65^{b}	1.268		
Geometry	≤ 38	5.59^{cb}	2.080	9.074	**0.000**
	39 - 53	6.72^{cd}	1.915		
	≥ 54	7.95^{bd}	1.432		
Measurements and Measures	≤ 38	5.26^{ab}	2.212	10.834	**0.000**
	39 - 53	6.83^{a}	2.051		
	≥ 54	7.90^{b}	1.334		
Mathematics (total score)	≤ 38	30.44^{ab}	9.732	10.552	**0.000**
	39 - 53	36.80^{a}	9.103		
	≥ 54	42.20^{b}	6.049		

Values marked with the letter "a" are statistically significantly different at the level ≤ 0.01,"b" at the level ≤ 0.000, and "c" and "d" at the level <0.05.

Teachers' assessment of achievement in mathematics in general, as well as in individual areas, was significantly related to the development level of visuomotor coordination, especially in children who had the lowest achievement on this subtest (below 25th percentile). The development level of visuomotor coordination is highly significant for geometry, since there were significant differences in the assessment of geometry knowledge/skills between students who achieved average and above-average results on this subtest (detailed in Table 4).

Table 5 shows students' achievement in different areas of mathematics with regard to their results on Visual Discrimination subtest (A3).

Table 5 *Visual Discrimination (A3) and teachers' assessment of students' achievement in mathematics*

Mathematics	A3 score	AM	SD	F(2)	p
Integers	≤ 51	7.22^{a}	1.726	3.529	**0.033**
	52 – 57	7.92	2.018		
	≥ 58	8.82^{a}	1.079		
Addition and Subtraction	≤ 51	7.14	1.693	3.577	**0.031**
	52 – 57	7.95	1.881		
	≥ 58	8.55	1.572		
Multiplication and Division	≤ 51	6.36^{bc}	1.915	7.875	**0.001**
	52 – 57	7.78^{b}	2.074		
	≥ 58	8.45^{c}	1.214		
Geometry	≤ 51	5.83^{ab}	1.540	7.275	**0.001**
	52 – 57	6.88^{a}	2.142		
	≥ 58	8.18^{b}	1.471		
Measurements and Measures	≤ 51	5.69^{ab}	1.802	6.661	**0.002**
	52 – 57	6.95^{a}	2.271		
	≥ 58	7.91^{b}	1.300		
Mathematics (total score)	≤ 51	32.25^{ab}	8.101	3.529	**0.033**
	52 – 57	37.48^{a}	10.002		
	≥ 58	41.91^{b}	6.252		

Values marked with the letter "a" are statistically significantly different at the level ≤ 0.05, and "b" and "c" at the level ≤ 0.01.

The development level of visual discrimination was significantly related to general achievement, as well as to different areas of mathematics. However, there were no significant differences between the selected groups of participants in the addition and subtraction area (detailed in Table 5).The significance of visual discrimination is particularly evident in acquiring knowledge and skills in multiplication and division, geometry, and measurements and measures.

Table 6 shows students' achievement in different areas of mathematics with regard to their results on Drawing Shapes subtest (A4).

Table 6 *Drawing Shapes (A4) and teachers' assessment of students' achievement in mathematics*

	A4 score	AM	SD	F(2)	p
Integers	≤ 34	6.97^{a}	2.275	4.296	**0.016**
	35 - 48	7.95	1.641		
	≥ 49	8.36^{a}	1.729		
Addition and Subtraction	≤ 34	6.90^{ab}	2.289	5.085	**0.008**
	35 - 48	7.91^{a}	1.455		
	≥ 49	8.36^{b}	1.753		
Multiplication and Division	≤ 34	6.45^{b}	2.339	6.274	**0.003**
	35 - 48	7.44	1.946		
	≥ 49	8.36^{b}	1.578		
Geometry	≤ 34	5.86^{b}	2.133	5.129	**0.007**
	35 - 48	6.68	1.901		
	≥ 49	7.56^{b}	1.805		
Measurements and Measures	≤ 34	5.90^{a}	2.257	3.805	**0.025**
	35 - 48	6.65	2.022		
	≥ 49	7.48^{a}	2.104		
Mathematics (total score)	≤ 34	32.07^{b}	10.869	6.161	**0.003**
	35 - 48	36.63	8.495		
	≥ 49	40.12^{b}	8.604		

Values marked with the letter "a" are statistically significantly different at the level ≤ 0.05, and "b" at the level ≤ 0.01.

Mathematics in general, as well as all individual areas, were significantly related to the development level of visuomotor and visuospatial abilities assessed by the ability to copy geometric shapes. The achievement on this subtest was particularly evident in acquiring knowledge and skills in addition and subtraction (detailed in Table 6).

Table 7 shows students' achievement in different areas of mathematics with regard to their results on Visual Memory subtest (A5).

Table 7 *Visual Memory (A5) and teachers' assessment of students' achievement in mathematics*

	A5 score	AM	SD	F(2)	p
Integers	≤ 47	7.34	1.990	1.949	0.147
	48 – 57	7.91	1.842		
	≥ 58	8.35	1.766		
Addition and Subtraction	≤ 47	7.21^{a}	1.933	3.448	**0.035**
	48 – 57	7.88	1.789		
	≥ 58	8.53^{a}	1.463		
Multiplication and Division	≤ 47	6.89	2.011	1.987	0.142
	48 – 57	7.54	2.123		
	≥ 58	8.00	1.936		
Geometry	≤ 47	6.03	2.060	3.536	**0.033**
	48 – 57	6.88	1.973		
	≥ 58	7.41	1.734		
Measurements and Measures	≤ 47	6.13	2.120	2.126	0.124
	48 – 57	6.77	2.207		
	≥ 58	7.35	1.902		

Values marked with the letter "a" are statistically significantly different at the level ≤ 0.05.

Differences in the achievement on Visual Memory subtest were not significantly related to the total score of teacher s' assessment of students' achievement in mathematics ($F_{(2)}$=2.781, p=0.066). By analyzing individual areas, a statistically significant relation was determined between the development level of visual memory and the achievement in addition and subtraction and geometry. A detailed analysis indicated a significant difference between the groups of participants only in addition and subtraction. This difference was present between students whose development level of visual short-term memory was below 25th percentile and students whose achievements on this subtest were above 75th percentile (detailed in Table 7).

Table 8 shows students' achievement in different areas of mathematics with regard to their results on Audio-Visual Association subtest (A6).

Table 8 *Audio-Visual Association (A6) and teachers' assessment of students' achievement in mathematics*

	A6 score	AM	SD	F(2)	p
Integers	≤ 49	7.16[a]	1.879	4.793	**0.010**
	50 – 56	8.06	1.943		
	≥ 57	8.63[a]	1.258		
Addition and Subtraction	≤ 49	7.16[a]	1.804	4.421	**0.014**
	50 – 56	8.02	1.892		
	≥ 57	8.50[a]	1.265		
Multiplication and Division	≤ 49	6.77	1.987	3.756	**0.026**
	50 – 56	7.67	2.179		
	≥ 57	8.19	1.559		
Geometry	≤ 49	6.14	1.773	2.962	0.056
	50 – 56	6.90	2.211		
	≥ 57	7.38	1.708		
Measurements and Measures	≤ 49	6.05	1.999	3.272	**0.042**
	50 – 56	6.90	2.283		
	≥ 57	7.44	1.825		
Mathematics (total score)	≤ 49	33.27[a]	8.888	4.159	**0.018**
	50 – 56	37.55	10.102		
	≥ 57	40.13[a]	7.302		

Values marked with the letter "a" are statistically significantly different at the level ≤ 0.05.

A statistical analysis determined that the achievement on Audio-Visual Association subtest was significantly related to the achievement in mathematics in general, as well as in individual areas (with the exception of Geometry). However, a detailed analysis did not determine statistically significant differences between the groups of participants in knowledge and skills in the areas of multiplication and division and measurements and measures (detailed in Table 8).

Table 9 shows students' achievement in different areas of mathematics with regard to their results on Sequence and Coding subtest (A7).

Table 9 *Sequence and Coding (A7) and teachers' assessment of students' achievement in mathematics*

	A7 score	AM	SD	F(2)	p
Integers	≤ 51	7.33	2.123	2.192	0.117
	52 – 60	7.74	1.905		
	≥ 61	8.37	1.497		
Addition and Subtraction	≤ 51	7.03[a]	1.956	4.291	**0.016**
	52 – 60	7.81	1.716		
	≥ 61	8.41[a]	1.716		
Multiplication and Division	≤ 51	6.50[b]	2.418	5.349	**0.006**
	52 – 60	7.46	1.881		
	≥ 61	8.22[b]	1.695		
Geometry	≤ 51	6.00[a]	2.213	3.436	**0.036**
	52 – 60	6.69	1.872		
	≥ 61	7.37[a]	1.884		
Measurements and Measures	≤ 51	5.87	2.403	3.141	**0.047**
	52 – 60	6.78	1.978		
	≥ 61	7.22	2.044		
Mathematics (total score)	≤ 51	32.73[a]	10.589	3.906	**0.023**
	52 – 60	36.48	8.973		
	≥ 61	39.59[a]	8.368		

Values marked with the letter "a" are statistically significantly different at the level ≤ 0.05, and "b" at the level ≤ 0.01.

Success on Sequence and Coding subtest was significantly related to the achievement in different areas of mathematics, except knowledge of integers. The difference in teachers' assessment of achievement was particularly evident in students whose development level of nonverbal inductive reasoning was below 25th percentile (detailed in Table 9).

Table 10 shows students' achievement in different areas of mathematics with regard to their results on Auditory Memory subtest (A8).

Table 10 *Auditory Memory (A8) and teachers' assessment of students' achievement in mathematics*

	A8 score	AM	SD	F(2)	p
Integers	≤ 39	6.81[ab]	2.271	5.049	**0.008**
	40 – 54	8.05[a]	1.610		
	≥ 55	8.21[b]	1.817		
Addition and Subtraction	≤ 39	6.93[b]	2.286	3.768	**0.026**
	40 – 54	8.03[b]	1.583		
	≥ 55	7.96	1.654		
Multiplication and Division	≤ 39	6.33[ab]	2.631	4.926	**0.009**
	40 – 54	7.73[a]	1.736		
	≥ 55	7.71[b]	1.829		
Geometry	≤ 39	5.70[b]	2.350	4.322	**0.016**
	40 – 54	6.97[b]	1.646		
	≥ 55	7.00	2.187		
Measurements and Measures	≤ 39	5.85	2.568	2.445	0.091
	40 – 54	6.88	1.851		
	≥ 55	6.92	2.244		
Mathematics (total score)	≤ 39	31.63[b]	11.738	4.395	**0.015**
	40 – 54	37.67[b]	7.860		
	≥ 55	37.79	9.404		

Values marked with the letter "a" are statistically significantly different at the level ≤ 0.01, and "b" at the level ≤ 0.05.

Students whose achievement on Auditory Memory subtest was below 25th percentile had lower achievement in mathematics in general, as well as in individual areas, except in measurements and measures (detailed in Table 10).

Table 11 shows students' achievement in different areas of mathematics with regard to their results on Concept Formation subtest (A9).

Table 11 *Concept Formation (A9) and teachers' assessment of students' achievement in mathematics*

	A9 score	AM	SD	F(2)	p
Integers	≤ 50	7.06[a]	2.300	4.151	**0.018**
	51 – 62	8.05[a]	1.599		
	≥ 63	8.38	1.586		
Addition and Subtraction	≤ 50	6.89[bc]	2.246	6.627	**0.002**
	51 – 62	8.05[b]	1.431		
	≥ 63	8.50[c]	1.592		
Multiplication and Division	≤ 50	6.29[bc]	2.504	8.838	**0.000**
	51 – 62	7.77[b]	1.630		
	≥ 63	8.38[c]	1.586		
Geometry	≤ 50	5.86[ab]	2.212	5.172	**0.007**
	51 – 62	6.90[a]	1.792		
	≥ 63	7.56[b]	1.861		
Measurements and Measures	≤ 50	5.63[bc]	2.327	6.560	**0.002**
	51 – 62	7.00[b]	1.931		
	≥ 63	7.50[c]	1.862		
Mathematics (total score)	≤ 50	31.71[bc]	11.132	6.813	**0.002**
	51 – 62	37.77[b]	7.901		
	≥ 63	40.31[c]	8.154		

Values marked with the letter "a" are statistically significantly different at the level <0.05, and "b" and "c" at the level ≤ 0.01.

Achievement in mathematics in general, as well as in individual areas, largely depended on the development level of verbal reasoning, especially in students whose score on this subtest was below 25th percentile (detailed in Table 11).

Table 12 shows students' achievement in different areas of mathematic with regard to their results on Acquired Language Treasure subtest (A10).

Table 12 *Acquired Language Treasure (A10) and teachers' assessment of students' achievement in mathematics*

	A10 score	AM	SD	F(2)	p
Integers	≤ 54	7.12[a]	2.100	3.191	**0.045**
	55 – 64	8.10[a]	1.742		
	≥ 65	7.83	1.835		
Addition and Subtraction	≤ 54	7.12	1.919	3.029	**0.052**
	55 – 64	8.04	1.727		
	≥ 65	7.83	2.041		
Multiplication and Division	≤ 54	6.50[a]	2.260	4.826	**0.010**
	55 – 64	7.76[a]	1.549		
	≥ 65	8.00	1.908		
Geometry	≤ 54	5.91[a]	1.913	3.602	**0.031**
	55 – 64	7.00[a]	1.986		
	≥ 65	7.00	2.098		
Measurements and Measures	≤ 54	5.79[a]	2.027	3.996	**0.021**
	55 – 64	7.03[a]	2.171		
	≥ 65	6.83	1.472		
Mathematics (total score)	≤ 54	32.44[a]	9.758	4.076	**0.020**
	55 – 64	37.93[a]	9.109		
	≥ 65	37.50	8.503		

Values marked with the letter "a" are statistically significantly different at the level < 0.05.

Even though the relation between the level of lexical development and the achievement in addition and subtraction area was on the verge of statistical significance ($p \leq 0.05$), there were no statistically significant differences between groups of participants with different levels of achievement on Acquired Language Treasure subtest. In all other individual areas, as well as in mathematics in general, lower achievement was determined in participants whose level of lexical abilities was below 25th percentile. However, statistical significance was determined only with regard to participants whose lexical abilities were average (from 25th to 75th percentile) (Table 12).

Table 13 shows student' achievement in different areas of mathematics with regard to their results on Automatic Language Treasure subtest (A11).

Table 13 *Automatic Language Treasure (A11) and teachers' assessment of students' achievement in mathematics*

	A11 score	AM	SD	F(2)	p
Integers	≤ 53	7.17[a]	1.748	5.261	**0.007**
	54 – 60	7.79	1.984		
	≥ 61	8.77[a]	1.541		
Addition and subtraction	≤ 53	7.19[a]	1.704	5.496	**0.005**
	54 – 60	7.70	1.986		
	≥ 61	8.77[a]	1.193		
Multiplication and division	≤ 53	6.64[a]	1.791	5.722	**0.004**
	54 – 60	7.45	2.283		
	≥ 61	8.45[a]	1.471		
Geometry	≤ 53	5.89[a]	1.833	5.797	**0.004**
	54 – 60	6.79	2.079		
	≥ 61	7.64[a]	1.706		
Measurements and measures	≤ 53	5.92[a]	2.048	4.942	**0.009**
	54 – 60	6.70	2.241		
	≥ 61	7.68[a]	1.701		
Mathematics (total score)	≤ 53	32.81[a]	8.562	5.949	**0.004**
	54 – 60	36.43	10.150		
	≥ 61	41.32[a]	7.233		

Values marked with the letter "a" are statistically significantly different at the level < 0.01.

The development level of morphosyntactic aspect of language development was significantly related to all areas of mathematics ($p<0.01$). Differences in achievement were particularly evident between students whose results were below 25th percentile and those whose success on this subtest was above 75th percentile (Table 13).

DISCUSSION

This research shows that a set of different functions and abilities contributes to the acquisition of mathematics knowledge and skills which to a certain extent reflect the typology of mathematical difficulties: visuospatial-motor type, semantic type (long-term memory), and procedural type (working memory) (Geary, 2004; Mazzocco, 2009).

Visuomotor coordination and *visuospatial integration*, assessed by the ability to trace a line and copy geometric shapes, were significantly related to all areas of mathematics.

It is well known that tracing ability represents one of the most important abilities in acquiring writing skills (Graham, 1999). However, it has recently been associated with the acquisition of knowledge and skills in different areas of mathematics, which was confirmed in this study. One of the studies determined that visuomotor coordination was significantly related to the ability to remember mathematical facts (simple arithmetic tasks), while visuospatial integration was also significantly related to procedural calculation (Pieters et al., 2012). Furthermore, the same study determined that children with dyscalculia had significantly more difficulties in the areas of visuomotor coordination and visuospatial integration, which is the result other researchers also obtained (Jongmans et al., 2003). The relation between visuomotor coordination and the ability to remember mathematical facts is hard to explain directly.

Thus, as assumed by the authors, it is possible that the quality of attention underlies this relation.

There is a belief that mathematics engages spatial reasoning, i.e. that spatial skills support the process of representation, analysis, and drawing conclusions on the basis of relations among objects (Clements & Sarama, 2011). Studies on brain visualization also support the relation between visuomotor abilities and calculation. These studies indicate that solving arithmetic tasks activates the parietal cortex, which is believed to represent a structural basis of visuospatial information processing (Rosenberg-Lee et al., 2011).

Recent studies indicate that visuaspatial abilities are also significantly related to the development of early mathematics skills. It has been determined that they significantly contribute to the acquisition of number sequences (Gunderson et al., 2012), and represent a strong predictor of the ability to identify a number and its size, as well as the ability to compare amounts (Son & Meisels, 2006; Verdine, Irwin et al., 2014).

Apart from that, it has been determined that manipulating visuospatial toys (such as Lego bricks) by copying given models at preschool and early elementary-school age significantly contributes to the development of mathematics skills in children (Grissmer et al., 2013, according to Verdine, Golinkoff et al., 2014). A similar result was obtained in much younger participants, which indicates that the relation between visuospatial abilities and mathematics skills is established as early as the age of three (Verdine, Golinkoff et al., 2014).

This research determined that the ability of *visual discrimination* significantly contributed to the acquisition of different mathematics knowledge and skills, especially in the areas of multiplication and division, geometry, and measurements and measures. Difficulties in differentiating similar stimuli may be manifested as problems in identifying mathematical symbols, understanding information presented as images, diagrams, or graphs (Gligorović and Vujanić, 2003), or understanding mass values of a number, and even basic understanding of quantity (Mazzocco, Singh Bhatia & Lesniak-Karpiak, 2006). By studying different aspects of visual abilities and motor skills in children with dyscalculia and typically developing children, it was determined that visual perception was necessary for calculating procedures, such as "borrowing and lending" and "transfer" (Pieters et al., 2012). Apart from that, visual abilities in general, especially visual discrimination, are considered a mediator of the relation between the abilities to approximately determine quantity/numerousness and calculation (Zhou et al., 2015).

Furthermore, this research determined that children with low achievement on *auditory memory* tasks had significantly lower achievement in all areas of mathematics (except in the area of measurements and measures), while children with difficulties in *visual memory* had lower achievement in the area of addition and subtraction.

The results of similar studies showed that auditory memory (phonological loop) was more significant than visual memory for doing mathematical tasks at this age (Holmes & Adams, 2006). The significance of visual short-term memory is more pronounced at a younger age, especially before the age of seven. Since children at that age still do not use spontaneous verbal repetition, they rely much more on visuospatial representations in retaining information (McKenzie, Bull & Gray, 2003). It turned out that visual short-term memory was a good predictor of achievement in different aspects of mathematics (knowledge of numbers and arithmetic operations, mental arithmetic, geometry, and interpretation of mathematical information) at the beginning of schooling, and that with age it remained significant only in solving complex mathematical tasks (Holmes & Adams, 2006). Authors believe that younger children mostly rely on visual memory mechanisms (visuospatial contour) in solving mathematical tasks, which indicates a predominant usage of visual encoding strategies at the beginning of formal schooling. In time, with the development of verbal strategies, phonological loop gains higher significance in solving mathematical tasks. However, when symbolic-linguistic arithmetic or direct strategy of remembering information cannot be applied, tasks are solved by going back to early visuaspatial strategies (Holmes & Adams, 2006). Also, it is believed that different modalities of short-term memory are responsible for different areas of mathematics, and that working memory is the only common denominator of general achievement in mathematics (Geary et al., 2007). In our research, a higher significance of auditory memory for acquiring different mathematics knowledge and skills was potentially the result of the fact that the set of memory tasks included tasks which involved the engagement of central executive system (verbal working memory), and also that the design of the applied subtests required the application of two different mechanisms of retaining information – simultaneous and sequential.

Apart from memory, perceptive and motor skills, it was determined that verbal and, to a somewhat lesser extent, nonverbal *reasoning* significantly contribute to acquiring mathematics knowledge and skills.

Reasoning abilities, related to the concept of fluid intelligence (Buha & Gligorović, 2015; Novosel & Nikolić, 1989), are usually closely related to academic success, especially to achievement in mathematics (Primi, Ferrão & Almeida, 2010; Taub et al., 2008). Fluid intelligence is generally defined as the ability to use mental operations in solving new problem situations, whose solving exceeds the routine approach or mere memorization. These operations include the following abilities: drawing conclusions, concept formation, classification, developing and testing hypotheses, identifying relations, understanding implications, and generalization (Primi, Ferrão & Almeida, 2010).

Nonverbal reasoning tasks, usually in the form of inductive reasoning (as is the case with a part of the task on Sequence and Coding subtest), are mainly significantly associated with the ability to solve contextual tasks, and to a lesser extent with calculation. This can be explained by the fact that in solving contextual tasks it is necessary to form mental representation of the problem (Jõgi & Kikas, 2016). Inductive reasoning tasks, as well as mathematical tasks, are based on the ability to notice patterns and relations among numbers or geometric shapes, which is often considered pre-algebraic reasoning. Numerous studies determined that this ability was related to early mathematics skills (Mulligan & Mitchelmore, 2009).

Verbal reasoning tasks (in this research in the form of drawing conclusions, applying classification and taxonomic categorization) usually have stronger relations with academic achievement n different fields including mathematics (Floyd, Evans & McGrew, 2003; Taub et al., 2008). Even though the reasoning mechanism underlying these tasks belongs to the concept of fluid intelligence, the usage of verbal mode requires the application of the acquired knowledge. Thus, it is believed that tasks of this type are the expression of crystallized intelligence, since their solving depends on the ability to acquire information and access stored knowledge, which is influenced by cultural environment, education, and language development (Wasserman & Tulsky, 2005).

With regard to that, it is not surprising that this research determined that different aspects of *language skills* were related to the ability to master mathematics content. By applying the same instruments for the assessment of developmental abilities, a previous study determined that lexical-semantic abilities had a moderate correlation with the achievements in mathematics, and that the correlation with morphosyntactic language aspect was significantly higher (Glumbić, Brojčin & Kaljača, 2004).

One of the hypotheses about the role of language in mathematical abilities is that language is the basis of reasoning, and thus of mathematical reasoning as well. According to this hypothesis, words used for counting are necessary for the development of the concept of numbers larger than three or four. With regard to that, children growing up in cultures where there are few or no words for denoting numbers will not develop the right or full understanding of the concept of numbers. This hypothesis is based on the example of Amazon tribes (Piraha and Munduruku cultures) who do not use words to denote numbers, and whose ability to think about exact amounts is reduced to very small numbers (Gelman & Butterworth, 2005; Gelman & Gallistel, 2004; Pica et al., 2004).

Neuroanatomic studies point to a potentially different interpretation of the relation between language and mathematics. Main areas of the brain involved in numerical processing are located in the parietal lobe, far from the areas responsible for language processing. Furthermore, brain lesions which cause difficulties in calculation are not necessarily accompanied by language difficulties, and vice versa. The example of people with autism also indicates structural dissociation. Apart from the pronounced deficit in the development of speech-language skills, people with autism do not have difficulties in performing exact arithmetic operations (Butterworth, 1999, according to Pica et al., 2004), which points to the fact that complex arithmetic operations may be performed without using words. Also, it has been determined that the activity in Broca's area is reduced while doing numerical tasks, which implies that numerical and language processing are in opposition (Gelman & Butterworth, 2005). This leads to the fact that having a rich vocabulary of numbers certainly facilitates the acquisition of counting and calculation, but that it is not necessary for the development and possession of numerical concepts.

A certain relation definitely exists, which is indicated by correlative studies on typically developing population and difficulties in mathematics with which children with dyslexia and developmental language disorder are faced (Gligorović, 2010). In typically developing population, for example, it has been determined that the range of vocabulary (receptive and expressive) significantly and highly correlates with the understanding of cardinal numbers in preschool children (Negen & Sarnecka, 2012), and that language skills account for a significant part of arithmetic skills variance at preschool and early elementary school age (Praet et al., 2013). Also, it is believed that difficulties in understanding speech may hinder solving mathematical problems and affect the conceptual understanding of calculation, as well as success in doing contextual tasks (Jordan, Hanich & Kaplan, 2003). This relation between language and mathematics is most clearly observed in children with developmental language difficulties (Fazio, 1999), in whom problems in mathematics are manifested as difficulty in acquiring number sets and developing numeracy (Donlan et al., 2007).

Research results indicate that speech-language skills are related to understanding rational numbers (Seethaler et al., 2011). According to authors, language skills may facilitate conceptual understanding of rational numbers as a result of formal (educational) and informal experience while participating in various everyday activities (e.g. understanding the expression “half of something”).

Language skills are one of the most important preconditions of acquiring early mathematics skills (Toll & Van Luit, 2014). Big individual differences in language and mathematics skills may be observed at preschool age (Fuchs et al., 2010), and they have a tendency to persist at older age (Tymms, Merrell & Henderson, 1997).

CONCLUSION

By summing up the results, it can be concluded that visuospatial and visuoconstructive abilities, visual perception, short-term memory, language skills, and reasoning significantly contribute to the acquisition of knowledge and skills in different areas of mathematics.

Children whose achievements on Visuomotor Coordination and Sequencing subtest were below 25th percentile had significantly lower achievement in all areas of mathematics ($p \leq 0.000$-0.039) compared to children whose achievements were above 25th percentile. Of all the assessed areas of mathematics, geometry was singled out as an area which was significantly related to the development level of visuomotor coordination since achievement differences in the area of geometry were significant when both students with average (from 25th to 75th percentile) and above-average (above 75th percentile) results in visuomotor coordination were compared ($p=0.042$).

Children who had poor results on Drawing Shapes subtest (the lower quartile) had lower achievements in the area of addition and subtraction. Their achievements were significantly different from the achievements of children with average ($p=0.046$) and above-average development level of the ability to copy geometrical shapes and lines ($p=0.012$). Their achievement was lower in all other areas of mathematics, but statistically significant only when compared to children whose development level of visuomotor and visuospatial abilities was within the upper quartile ($p=0.003$-0.025).

Children who had low achievements on Visual Discrimination subtest (below 25th percentile) had significantly worse results in the areas of multiplication/division ($p=0.003$-0.010), geometry ($p=0.002$-0.036), and measurements and measures ($p=0.009$-0.016) compared to children who had average and above-average result on this subtest. When compared to children in the upper quartile, these children had a lower level of knowledge and skills in all areas of mathematics ($p=0.002$-0.049), except in the area of addition and subtraction ($p>0.05$).

Achievement on Audio-Visual Association subtest was significantly related to success in all areas of mathematics, except geometry. Significant differences among groups of children with different level of achievement on this subtest (upper and lower quartile) were determined in the knowledge of integers ($p=0.027$) and addition and subtraction ($p=0.040$).

Children who had poor results on Auditory Memory subtest had significantly lower achievement in the knowledge of integers ($p=0.017$-0.029) and multiplication and division compared to all other groups of participants ($p=0.013$-0.055). The group with the lowest achievement in auditory memory had significantly worse results in the areas of geometry and addition and subtraction, but only when compared to children whose achievements on this subtest were average ($p=0.024$-0.032). The area of measurements and measures was not significantly related to the development level of auditory memory ($p>0.05$).

Achievement on Visual Memory subtest was significantly related to the success in the areas of addition and subtraction and geometry. However, significant differences among groups of children with different level of achievement on this subtest were noticeable only in the area of addition and subtraction. Children whose achievements were in the lower quartile got significantly worse marks from their teachers than children whose achievements on this subtest were in the upper quartile ($p=0.040$).

Nonverbal reasoning, assessed by Sequence and Coding subtest, was significantly related to all the assessed areas of mathematics, except knowledge of integers. Significant differences in achievements were determined between children whose level of inductive reasoning was in the lower and upper quartile, in the areas of arithmetic operations (addition/subtraction ($p=0.013$) and multiplication/division ($p=0.005$)) and geometry ($p=0.030$).

Verbal reasoning, assessed by Concept Formation subtest, was significantly related to all areas of mathematics. Children whose achievements on this subtest were below 25th percentile, had a significantly lower level of mathematics knowledge and skills compared to children who had average ($p=0.002$-0.039) and above-average achievements ($p=0.002$-0.013).

Lexical-semantic and morphosyntactic language skills significantly contribute to the acquisition of mathematics knowledge and skills in all the assessed areas. Students with achievements below 25th percentile on Automatic Language Treasure subtest (morphosyntax) had significantly worse results in all areas of mathematics ($p=0.001$-0.002). Low achievement on Acquired Language Treasure subtest (lexis) was significantly related to poor results in the areas of knowledge of integers ($p=0.039$), multiplication and division ($p=0.010$), geometry ($p=0.028$), and measurements and measures ($p=0.017$), but not in the area of addition and subtraction ($p>0.05$).

Bearing in mind a wide range of developmental abilities which contribute to the acquisition of knowledge and skills in different areas of mathematics, it would be desirable to conduct a systematic assessment of cognitive-motor abilities at preschool age in order to detect children at risk and provide a foundation for the development of mathematics skills by adequate and timely stimulation of different abilities – visual, motor and language.

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EFFECTIVENESS OF TEACHING ARTS IN RELATION TO STUDENT'S DISABILITY

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SUMMARY

Art culture as a subject in educational system is an integral part of compulsory primary education both in regular schools and special ones. Children with disabilities/developmental disorders represent a heterogeneous group characterized by a certain deviation that in greater or lesser extent, affects the process of their upbringing and education. The question is to what extent certain level of disabilities and disorders acts on teacher's ability to realize teaching of Art culture with these students? Therefore, the aim of our study is to examine effect of different conditions/disorders on effectiveness of teaching Art culture from the perspective of educators. The research was conducted on a sample of 28 participants who teach Art culture to children with disabilities. The research was conducted during the second semester of the school year 2014/2015, in May and June 2015, in five different primary schools, which are located on the territory of Belgrade. Collecting of information were carried out through in-depth non-standardized interview. The interview was carried out on the basis of a questionnaire drawn up for the purposes of the study. Each interview is in agreement with the participant and filmed entirely tonal. The results of our study states that there are difficulties in realization of a class of Art culture, they are unfortunately unavoidable companion of teaching process which is performed with disabled children. Regardless of the fact that it is known that the teaching of Art culture is one of those subjects in which disabled children achieve the best results, research has shown that its realization is imbued with numerous, smaller and larger difficulties, waiting their turn to be overcome. The biggest problems occur in education of multiple disabled children, whose condition exceeds limits of adjustments and requires conditions that participants fail to provide. The variety of conditions and disorders that can befall a child, requires a high degree of creativity and imagination of educators, so that they can in a new way overcome bariers in realization of education. The fact that a great number of disorders are considered as permament conditons, indicates the difficulties with which educators are faced with during the realization of education with disabled children.

Key words: art education, children with disabilities/developmental disorders, special educator

INTRODUCTION

Art Culture represents a complex area, and this complexity is reflected in the variety of phenomena, its theory and practice. It is an integral part of work and production, visual communication, daily living, housing and clothing, leisure and entertainment, as well as a component of opera, ballet, films, plays, events, celebrations, etc. (Eminović, 2009). "Art culture as a school subject is an integral part of compulsory primary education that helps pupils to understand the structural relationships of the world, opening new horizons for viewing, creating basic preconditions for development of thinking, imagination, sensitivity and motor activity, and in the artistic activities focus on the social and cultural aspect which makes student become aware of his cultural context and social environment" (Kuščević et al., 2011, p. 216). Art is an important tool in improving communication and problem solving skills, as well as for the development of motor skills and encouraging self-expression and creativity. It can also be used as a tool in developing social and emotional skills (Kohl, 2011, by: Diment, 2012). First drawing experience a child acquires spontaneously by drawing lines with a pencil on a paper. It does not arise from the consious intention to display a particular object, but from a sense of satisfaction that comes from their own kinesthetic activities (Cvetković, 2014). Throughout teaching of arts, by drawing and by artistic expression, children develop their skills, which is of particular importance when it comes to children with disabilities/developmental disorders.

Children with disabilities

A child whose development is burdened by any deviation is not only less developed child than his healthy peers, but otherwise he is a differently developed child whose damage is projected to all aspects of his personality, perceived in his totality as a bio-psycho-sociological entity (Kovačević and Arsić, 2006). We live in an age when most of the world looks with favor on the integration of children with disabilities, trying to better understand their condition and improve their health status and thereby to provide them a life worthy of human beings. Effort to integrate disabled people into community, and that from the very beginning they are to be raised as equal members of society, proved to be the most correct one and therefore the standards of today aspire to this goal. In order to proclaime the world's recognized right of all children to education, UNESCO organized a series of international conferences on the issue of "Education for All" in Jomtien (1991), Salamanca (1994), Dakar (2000) and according to their principles and principles, inclusive education becomes an integral part of education laws and national frameworks of many countries (Jablan and Kovačević, 2008).

It is not easy to calculate the number of disabled children. By organizing the system of prevention, detection and rehabilitation, number of possible disorders is being minimized and in more effective way resulting disorders are being treated, while more subtle diagnosis "increase the number of" intellectually and emotionally disturbed children. Assessments of individual countries that have attempted to introduce a central register, range from 7% to 12% of the total population of children. The first assesment relates to difficulties in development in the narrow sense (sensory, physical and intellectual disability) and second assesment includes children with emotional disabilities and children who live in extremely unfavorable social conditions (families and communities burdened by prejudices) (Radojević, 2011). The Australian Bureau of Statistics, conducted in 2009 a study on disability, aging and welfare, which showed that 7.2% of children younger than 15 years is disabled, while 3.9% is severely disabled (Diment, 2012).

Although the ability of artistic expression and creation is inherent to all children, in fact to all people, it is possible and it occurs only as a result of individual work of art that represents individual perceptions, conceptions and ideas as well as finding and creating their own forms which these visions, perceptions and ideas express (Belamarić, 1986). The question is to what extent certain level of disabilities and disorders act on teacher's ability to conduct teaching of Art culture with these pupils? Therefore, the aim of our study is to examine the effect of different conditions/disorders on effectiveness of teaching of Art culture from the perspective of educators.

METHODOLOGY OF REASEARCH

Sample. The research was conducted on a sample of 28 participants who teach art culture with disabled children. 27 participants by profession are special educators and rehabilitators (somathopedics, surdologs, speech therapists, typhlologues and oligophrenics), and one participant was a teacher who had a long lasting experience in working with disabled children. Four respondents were male and 24 were female.

The time and place of research. The research was conducted during the second semester of the school year 2014/2015, in May and June 2015, in five different primary schools, which are located on the territory of Belgrade.

The survey instrument. Collecting information were carried out in-depth non-standardized interview. The interview was carried out on the basis of a questionnaire which is designed for this research. The questionnaire was made up of open-ended questions. The questions referred to the difficulties faced by teachers, as well as the specific difficulties encountered by children with various disorders. In the interview participated educators who were directly interviewed.

Data analysis. Each interview is in agreement with the participant and filmed entirely tonal. This method of data collecting does not allow the loss of information, and sound recordings can later be analyzed in detail, taking into account even the manner of speech or emotions presented during the interview. Regarding the fact that the information was collected throughout interview, the answers contained a large number of less relevant and irrelevant information which requested selection. For each question of the interview, chosen answers of all participants were collected. Responses were analyzed, compared with each other, and then integrated into a concise whole.

The data were analyzed by qualitative method. Qualitative research place a participant into a role of an active participant in the study, who contributes to making final conclusions by making their own judgment.

THE RESEARCH RESULTS WITH DISCUSSION

Influence of different forms of damage to effectiveness of the work of art

Children with motor disorders. Our participants point out that difficulties in teaching Art culture most often occur in children with disorders of upper extremity, when it comes to children with motoric disorders, when they use accessories and materials.

Due to the underdeveloped catches, involuntary movements or weakness of muscle of the hand, students with physical impairments often drop materials. Coordination is also one of problems which children with motoric disorders make unsuccessful. Some children have a pronounced muscular tonus which limits their fluency of movement. They strongly press during drawing lines, make sudden movements, and often drill paper and break pencils.

Participants further state that on the other side, children with muscle weakness of the upper extremities are characterized by low mobility arm. Movements are slow and uncertain. Pressure which a child creates is not enough, however, when using colored pencils and pencil on paper remains extremely faint trace or it is entirely absent. Teachers solve this problem by replacing crayons with markers. Teachers state that they are forced to glue the paper on which a child draws onto a table, because children can not abide it by hand during the activity. When it comes to sculpting techniques, these children do not have strong enough grip to soften plasticine. Teachers have to prepare it or to use softer "Play doh" plasticine or colored dough that requires minimal power fist. For realization of program of art culture pupils should have developed manipulative dexterity (the so-called developed technical skills). This first and basic precondition for artistic creativity in some physically disabled students (cerebral palsy, amputations, paresis) often is not satisfied to some extent or completely. That is why one of the main tasks of Art culture in working with cerebral paralyzed children is by practical work to enable development of their motor skills and to contribute to the reduction and prevention of deformities (Eminović, 2009).

Teachers consider that in working with these children using watercolors or tempera gives greater freedom of movements, and malfunctions are not clearly visible as at drawing techniques. Difficulties arise in preparation of artistic materials. Children have difficulty in measuring colours, water and in generally in assessing quantities of material required. Difficulties arise when these children perofm a specific task for a longer time, given that even for the simplest tasks they need much more time than their peers of typical development. Then comes fatigue, physical and psychological, loss of motivation and attention, resulting in an interruption of activity.

With a variety of disorders of muscles extremities, these children may also have eye muscle disorders. Disorders such as nystagmus or strabismus harden perceptual skills, eye-hand coordination and orientation on paper. "Usually perceptual damaged are proportional to the degree of physical damage, and damaged ability of observation leads to difficulties in identifying relationships and causal relationships between objects and observing the internal properties of the object" (Nikić, 2008, p. 161). Children with disorders of gross motor skills "never" will be able to achieve the proper balance of mobility and visual control that would advance to pre-shematic or shematic stage (Horvath, 2009). Significant delays are discovered in development of artistic expression of children with cerebral palsy compared with standard achievements of pupils of development order of the same age (Pacić et al., 2013). The motor disorders of cerebral palsy are often combined with disordered of senses, cognition, communication and behavior, as well as epilepsy and other neuromuscular disorders (Rosenbaum et al., 2007).

Children with visual impairments. Visually impaired children are difficult to distinguish colours, especially shades of similar colours. The experience of these children is poor, and their works are simple and with little detail. Due to bad experience they very hard connect similar terms. They have a problem with the use of artistic materials, especially one that requires precision. Visually impaired children with the ability to distinguish colors and shapes may participate in the work with the necessary adaptations. Most often they successfully use several main colours, while teachers as they themselves say are often forced to tolerate the problem with mixing colours and using inadequate ones. Knowing and understanding impact of visual impairment on development can contribute significantly to understanding of situation of children with slight disorders in vision in teaching process (Vučinić et al., 2012).

As a result of visual impairment, these children have poorer visual-motor control. An eye does not manage to follow movements of a hand. When using collage paper, teachers cut paper and cardboard sa that children would not injure themselves when working with scissors. Due to complete visual impairment which is leading sense in art culture classes, totally blind children face insurmountable difficulties in realization of many techniques. These children do not have the ability to perceive light and can not successfully perform most art techniques. Blind children are mostly engaged in sculpting and thus they through tactile senses recognize shapes and sizes.

Refractive disorders when they are not properly adjusted, may also create difficulties in the classroom. These are disorders that lead to irregular refraction of light in cornea and an eye lens so that an image formed on retina does not match an real object (Kostovska et al., 2003). Objects are unclear and blurry, distorted and unrecognizable, so that teacher can notice that the child squints, looks at a picture of just one (healthy) eye or otherwise compensate their damage. Looking into distance, near or observation of small objects and details will create difficulties depending on a type of disorder that is present. Visually impaired child will require special lighting that will make his work easier, with the use of bright colours and bolded lines. Lack of an eye leads to lackof "stereo" vision, and these children have problems in recognizing the depth of the space. Children with visual impairment with difficulties will follow the demonstration of a certain movement, action or object, so that the method of working with visually impaired children, require adjustment.

Children with hearing impairment. According to participants, these children do not encounter great difficulties in artistic work. Art techniques do not require the presence of hearing. Deaf and hearing impaired children with difficulties follow information presented verbally in frontal type of work, and an introductory part of a lesson with an introduction of new material brings difficulties. By lips reading more experienced children can understand speech, and a teacher during the time of speaking has to be faced toward the child who does not listen to his words, but accepts them visually. Deaf and hard of hearing can hardly adapt to language system that is adopted in conjunction of sound and meaning. As a result many language deficits and difficulties are created, which leads to difficult and disabled communication and to a difficulty in acquiring knowledge (Isaković, 2013).

Level of inteligence plays an important role in a process of auditory perception and communication, so it is not strange if a child with a major hearing impairement but with higher intelligence quotient is more successful in work than a less intelligent peer. Glossary of a child with hearing impairment is not developed as in children with typical development, and for more complicated terms but also often and for simple ones, a teacher must give an approach to the student.

Children with speech disorders. Speech disorders vary in the degree of damage and etiology. According to participants these disorders usually represent successors of more serious impairements, such as cerebral palsy, tumors or insufficient mental development. Teachers and children eventually develop some form of non-verbal communication, which allows them to easily communicate. These are usually simple signals that carry a particular meaning. For example, sticking their tongues out carries a disclaim, and nodding a head has an affirmatively meaning.

The problem with this kind of communication is that children can not express complicated requirements or questions, and they experience a certain degree of frustration. The teacher must therefore monitor work and reactions of a child, in order to recognize in time children's difficulties. Children have difficulties in communicating with each other, and work in teaching of Art culture is often only limited between teachers and pupils.

Children with intellectual disabilities. The American Association for Intellectual Disability (AAMR, 2002), this disorder defines as a disability that occurs before age 18, and which is characterized by significant limitations in intellectual functioning and in adaptive behavior, which cover most everyday social and practical functioning. Insufficient mental development can occur in a variety of shapes, from light, moderate and heavy towards deep. The reform of the education system one number of the "easier" disabled children integrated into classes of regular schools, in special schools there are children with much more difficult diagnoses that can attend these classes at IEP, they adopt teaching materials with more difficulties, and this is also in the case with teaching of Art culture. Intellectual disorders are often companions of serious neurological disorders that further complicate the functioning of children. In this section we will talk about the difficulties experienced by children with intellectual disability as leading disorder.

As with other disorders, difficulties vary depending on degree of impairement. So participants point out that intellectual disability creates difficulties in almost all segments of Art culture. All parts of a class and all forms of artistic activities are also affected and are more difficult by mental disabilities. Difficulties arise more in an introductory part of a class, when a teacher gradually introduces students to teaching of topics. The situation of these children requires multi-sensory approach to teaching. At the beginning of a class, when the teacher speak to all students, intellectually disabled children have a problem to understand tasks and operating instructions. They need a very specific form of communication, without the use of abstract concepts which they do not understand. Multiple orders must be broken down into individual and every following is given only when we see that a child has fulfilled a previous task. Depending on the disorder and possible follow-up intelligence disorders, depends and quality of communication.

Motor skills of these children, as teachers state, is also demaged which is very obvious through performing skills, because hand movements do not have precision and cohesion. Mental disorders impair the proper conduction of cognitive components of movement initiation, navigation and catch, without which a successful movement is not possible. The lack of just one of these components damages entity of movement and it will laed to failure. In performing of art techniques, intelligence disorder will manifest itself in a very poor and unrealistic drawing without details, which is suitable to a child of much younger age. The work of these children is characterized by scribbling, imprecision in drawing lines and painting, and sculpture inability to form something meaningful. Failure also as one of factors negatively affects success of work. The vicious circle that begins with failure, leads to dissatisfaction and frustration that create new failures, and result in a loss of motivation.

Participants state that the biggest problem in working with children with intellectual disabilities is that they do not understand a task that is asked of them. It is necessary to simplify the task in order to involve a child into an activity. An educator is forced to simplify teaching material to very specific level, because children do not understand how such techniques operates,e.g. the use of watercolors or the use of seals for graphic techniques.

One of the participants stated an example of drawing a spring landscape, where a picture of a sunny day is often reduced to a drawing of the sun, and that is a circle which a child would try to paint yellow colour. Most often not even such an easy task can not be performed in a successful manner. Overshoe and Glumbić (2005) state that in these children there is often a problem of maintaining direction of a line, spatial organization, identifing spatial zones which is linked with the general issue of motor functioning that occurs in these children. Teachers from their own experience state that children with moderate intellectual disabilities know colour only through association (grass, sun, sky, etc.). Another participant gives the example of a girl who works at the intellectual level of a child of 8 months. Work with this little girl is not of educational character but of upbringing one.

Unlike hard disabled children, children with mild mental disabilities were able to participate in the work. By adapting the techniques, it is possible to develop the potential of children, graphomotoric, attention and coordination. By analyzing relationship between the levels of development of drawings and defined independent variables (age, gender, level of education, level of intelligence, family status, and socio-cultural deprivation) in people with intellectual disabilities, statistically significant relations to more parameters of drawings developments are set only in the realms of intellectual abilities and levels of education (Gligorović and Buha-Đurović, 2009).

Like all cognitive functions, perception of the senses is also disrupted in these children. Although it smoothly comes into the brain, sensory information is processed slowly and limitedly. Perception is also influenced by attention which is volatile and weak, so the pupils therefore have a problem with the detection of details and essential characteristics of objects and phenomena. All this affects the experience which is very poor, but the children who were able to acquire speech, are characterized with poor vocabulary.

Children have different learning styles. The research results made by Žulić and Žižek (2006) show that about 40% of students have dominant visual style, 30% have auditory and 30% kinaesthetic. A teacher needs to find an appropriate learning style that suits a child with intellectual disability and to adapt teaching process in a way that suits appropriate learning style.

Children with autistic spectrum disorders. When it comes to children with autism spectrum disorders, teachers report that degree of disorder as well as success in the work will depend on the intelligence of a child and on developed communication. Because "Autism does not represent a single disorder, but rather a range of clinical manifestations with probably different mechanisms of cerebral dysfunction" (Glumbić et al., 2013, p. 105). Motoric is often preserved but conscious of a child is narrowed, autistic, so he is unable to participate actively in the work. He is only interested in his themes, which often have no connection with reality.

Although preserved hearing and speech, many children from these group of children are not able to intellectually work out given tasks and therefore require special assistance in work, which is followed by a demonstration. Speach therapist draw a picture, and a child paint it and so on.

Mental absence of pupils with autistism prevents them from taking participation in work. In most cases, after failure in cooperation, teachers are forced to leave autistic child to his activities. During an interview with one of the participants, one of the pupils with autism was all the time circling around examiners constantly repeating a few unintelligible sentences from a favourite cartoon. The examiner was trying in various ways to start the communication in any form, but it was completely unsuccessful. His speech was autistic, egocentric and did not serve communication. Some time later, when he got thirsty, he came to his teacher very energetically and asked her to fetch him some water. With the environment he communicated only when it was necessary to satisfy some physiological needs of his own. This example is given, because the majority of those who have in their classes pupils with autism, usually intellectually handicapped, said that they have similar cases. Art work is at best reduced to a drawing that is not connected with the theme or the work of other children.

Children with emotional and mental disorders. These children are characterized by inappropriate behavior and outpouring of emotion that is not appropriate for the environment and the context in which they are. According to teachers, these children are irritable and very easy start a conflict with other children. Emotionally unstable. Dissatisfaction can occur for no apparent reason, probably caused by personal frustration with situation in which they find themselves, pain or failure. Considering the fact that the problem is very expressed, it is transferred to learning process. The child is prone to self-harming, throws his or other pupils' accessories, torn paper, destroys his own or someone else's work, and sometimes physically attack some of the other pupils. Restlessness is then in chain reaction extended throughout the whole class and breaks the former harmony.

Participants believe that when a child is intellectually and motorically preserved it is possible to establish cooperation, although others note that such a child is able to provoke a greater mess. Attention of these children is generally poor, and motivation for work is impaired by emotional fixation on a particular person, event or object. Pupils who have experienced trauma, often lack a sense of success in school. They often have the wrong diagnosis of hyperkinetic syndrome, and a therapy that they receive further reduces their presence (Johnson, 2013). Art work will allow them to express their emotions, release repressed aggression, sadness or discontent and thus overcome difficulties.

Došen (2005) in his study states that in children with moderate mental retardation (IQ 35 - 50) externalized problems are present. He states that such children and adults can show signs of motoric restlessness, stereotypes, can be impulsive and aggressive and stubborn, negative and focused on seeking somebody else's attention. In children with mild intellectual disorders may occur internalized aspects of problems in behavior that usually occuir in the form of excessive worry, anxiety, sadness and aspirations towards social isolation (Gligorović and Buha, 2013). A job of a teacher is to calm a child and to try to involve him in work of art, which will channel a part of his unrest.

Children with chronic illnesses. These children have difficulties which burdened a child's functioning and therefore affect the performance of his work at school, although not necessarily directly affect artistic skills. Teachers point out that the child gets tired quickly, break class to take therapy or often is absent due to hospitalization. Children with chronic diseases are often sensitive, overprotected, of low immunity and therefore susceptible to new infections. According to participants, often absence breaks continuity in work, creates difficulties in mastering art techniques.

Epilepsy is a chronic disease often present in children with cerebral palsy. Attacks are usually petit mal, small and short with a duration of a few seconds, pass unnoticed because they are not followed by more serious symptoms. According to participants a child for a moment, looks like taking a break and after a few seconds once again regain consciousness. Teachers most easily observe them during work or walk when interrupting of an activity is obvious. Such attacks do not affect significantly performance of teaching, but these children have difficulty with attention and focus.

Many children with chronic illnesses are meteoropats so that beside all the difficulties mentioned they badly tolerate sudden changes in weather conditions. There may appear pain, fatigue, insomnia, nervousness or irritability that lasts for days and totally exhaust children. Special education teachers must observe these difficulties and adapt the work for the child's current condition or completely relieved him from duties. A particular problem is teaching in a hospital setting. "Children in the hospital room are of different ages and number. Therefore, you should first talk to a doctor about any child, contraindications and possible modes of approach" (Eminović et al., 2011, p. 68).

The children with hyperkinetic syndrome. These students very easily change topic, and educators have a big problem in keeping their attention. The teachers state they are forced to constantly attract attention of children. Children are continuously on the move, often even when sitting moving in one place. They do not stand still neither in the desks, as if they were "on pins and needles". Because of these mentioned characteristics, they rarely deeper involve in work. One participant states that her pupil has great difficulties when working at a desk, on paper, but when she allows him to work on the blackboard or on a large "flip chart", he shows a lot more interest and achieves greater success.

During an individual work, a child often without having a real need walks around a classroom, spills colours, starts working on one side of a paper and than ask for another etc. As one teacher noted, they usually include in an activity when they see that all other pupils are working, because they like to be involved in activities of a group and to become a part of it.

Regardless of their hyperactivity, researches confirm that there are no significant differences in expression of children's creativity in children with hyperkinetic syndrome and compared to typical children population (Kojić and Markov, 2008), and the main task of special education teachers is to keep under control children's behavior and attention in order to use these potentials in more useful way. Considering the fact that attention is one of the most important disorders in these children, and that it is also one of the conditions of success in performance in the classroom, teachers must commit themselves to its maintenance. One way is to remove the excess stimuli from the environment that would deter attention. So participants as a recommendation point out that on the table in front of a child should be placed only what is necessary and that classroom should not be noisy.

However, in special schools there are mainly children with hyperactivity which is only following disorder, and it do not cause real major problems in learning process, while children diagnosed with "only" hyperkinetic syndrome, are educated in regular schools.

Children from socially, culturally and materially non-stimulating environments. According to participants, the largest number of these children is characterized with poor experience. Knowledge of general terms and the environment is scarce. Poor upbringing, lack of family atmosphere and "the warmth of home", make these children emotionally unstable, passive and dependent. Difficult conditions of life and upbringing hinder their successful schooling. Poor financial conditions further contribute to poor success in school. Children usually do not have tools for art work. They are indifferent to work, because they do not understand the importance of art education nor its value or application in life. Emotional difficulties accompany most of these mentioned children, but very easy they can remain unnoticed, hidden in laughter and outcries. Drawings only sometimes imply the emptiness that many children carry within them. Traces of a traumatic childhood, are pushed deeply into the unconscious, and only sometimes through art can be emerged onto the surface. Their works are poor, with no details, drawn only in one color, usually black.

In the environment in which they grow up art is mainly not appreciated and children do not have developed sense of beauty. They are growing up in an environment which do not encourage development of their potential, but only meet the basic needs of these children, and we can often encounter children with pseudo mentally retarded symptoms, which to an inexperienced educator may look like a mentally retarded, although they are not. However, research shows that various biological factors may adversely affect intelligence and lead to a higher incidence of mental retardation in children who had been exposed to these factors: malnutrition, inadequate nutrition, exposure during intrauterine period specific toxins such as lead, alcohol, drugs or pesticides (Biro et al., 2006). Vujačić (2006), states that the development of Vygotsky's theory emphasizes decisive influence of social factors on development of a child because, according to him, there are more and more mental functions of social origin: thinking, written and oral speech, emotions and willing attention. All the above information tells us that children from non-stimulating environments have very serious problems, which are not stopped on difficulties in emotional and educational plan, but they already claim intelligence, thinking, speaking and other important functions.

Children with multiple disorders. Working with multi-handicapped children can be considered as the most difficult form of education. Almost all children diagnosed with cerebral palsy, in classes of participants were with multiple disorder, and the main difficulties that teachers face in their work with these students will be stated. All participants stated that in working with multi-handicapped children have great difficulty because application of any artistic technique involves their assistance. More serious forms of mental disability associated with immobility and sensory disorders represent a major challenge in work.

Participants state that if you imagine a blind, intellectually handicapped student, with quadriplegia, or a pupil with Down syndrome impaired with cerebral palsy and sensory impairments, who spends most of the time in the "fetal position" on the floor, we wonder ourselves whether the school system can be adapted to needs of these children. Various cases of combination of defects do not represent sum of two or three defects, but are qualitatively new phenomena which therefore requires special elaboration and specific methods of work in practice (Rapaić and Nedović, 2007).

Children with multiple disabilities, regardless of combination of disorder have difficulties in all aspects of art education. Cognitive functioning may or may not be directly affected, but due to combined disturbances it will be compromised. Cognitive functions are related and conditioned, and a problem in only one segment can in chain reaction affect the others. Thus, difficulties in attention, memory or perception will make art work for these children difficult. Regardless of whether motor skills, sensory organs and intellect are damaged, motor functioning of multi-disabled children will be disturbed. Movement performance within the fine motor skills, which is one of the most delicate forms of motoric functioning, will be difficult and will disable proper adoption of art techniques.

However, as participants mention activities of multiply disabled children on a class of Art culture do not differ much from those on classes of Serbian language or Mathematics, on which they also fail to adopt and write letters or numbers. Educational requirements are therefore reduced to a minimum, and although basic, tasks are usually transmitted from one year to another because a child is unfortunately not able to fulfil it.

CONCLUSION AND IMPLICATIONS FOR PEDAGOGIC PRACTICE

The results of our study suggest that there are difficulties in the realization of a class of Art culture, which are unfortunately inevitable companion of teaching that is performed with diabled children. Although a profession of a special educator was created as a response to inability of education of children with developmental disorders and difficulties under supervision of teachers in regular schools, and its presence significantly facilitated the problem by developing specific methods and principles of special education and rehabilitation, problems in teaching did not come to an end.

Regardless to the known fact that that the teaching of Art culture is one of those subjects in which disabled children achieve the best results, research has shown that its implementation imbued with numerous, smaller and larger difficulties, waiting their turn to be overcome. The biggest problems occur when educating of multiple disabled children, whose condition exceeds the limits which require adjustments and conditions, and none of the participants failed to provide these. Participants who realize class with these children, encountered insurmountable difficulties, and noted that their work on a class of Art culture does not differ from activities on a class of any other subject.

Simplified tasks and work on a class, usually have no characteristics of a class of Art culture. Non-existing paradox of Achilles and the tortoise, we can replace by the current who protagonists are multiply disabled children and teaching process of Art culture. A reduced class will with any new change include less characteristics of art culture, and we can freely say that many children will never participate in Art culture classes because they will fail to "catch up" it because with every new change its essence is getting "further".

The variety of conditions and disorders that can befall a child, requires a high degree of creativity and imagination of educators, so that they can in a new way manage to overcome the barrier in teaching. The fact is that a large number of disorders are considered permament conditions, points out the difficulties that educators are faced with in working with children with disabilities. The presence of disorder in learning process requires a multidimensional approach, which multiple resources can compensate numerous difficulties. Our participants also believe that the presence of difficulties does not necessarily have a negative sign because their presence indicates that there is a watchful eye of science that finds and defines them with only one goal, to get them to successfully solution. Human health needs problems, Jung would say, and it seems that the "health" of science and the development of the same depends on the obstacles placed on its path.

Therefore, the views and conclusions of the participants in this study can be considered relevant and justifiable, taking into consideration the academic education and experience that characterizes them, which was one of the reasons why we have chosen qualitative data processing. Our results and conclusions can serve all educators who deal with children with disabilities, whether it is about regular or special school. Also, the results of this study are intended to affect other researchers to deal with this or similar topics to deepen and complement the knowledge in this field and thus collect data that would certainly be of crucial importance to special educators, teachers, parents and all professionals who work with children with disabilities.

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Theme 3

Individual Treatment of Developmental Difficulties and Disabilities

COMPLEX REHABILITATION TREATMENT IN PATIENTS WITH ICP IN REHABILITATION CENTRE RENONA-REHABILITATION SLOVAKIA

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The company of Renona – Rehabilitation was founded in 2011 with the aim to provide top quality specialised care in treatment of cerebral palsy, movement apparatus disorders and rehabilitation of post-traumatic conditions. The name of the company is a combination of two words – “**Re**” stands for rehabilitation, what we offer in top quality, and “**Nona**” is the name of a Roman goddess who spun the thread of life.

PREFACE

The work deals with the diagnosis of cerebral palsy (ICP – infantile cerebral palsy), namely in children. The disease is relatively common, it tends to raise. The work researches the impact of selected methods of physiotherapy on health condition and the health improvement of children. Data for the survey were obtained from a private rehabilitation center Renona – Rehabilitation in Šúrovce, this center deals primarily with ICP diagnosis. Data were collected in years between 2011 and 2016.

The theoretical part

Cerebral palsy is a disease of the central nervous system, it occurs in children and it should be diagnosed in the shortest period of time after birth. ICP is named even under the word “cerebral palsy”, it is defined of brain damage due to various reasons. It has different forms and types. We recognize the mild, moderate or severe ICP form, accordingly, they are associating with various disabilities such as speech, vision, motor. The brain as a controller manages and controls all systems and mechanisms of the human body, also physical ones. Physical dysfunction can be observed in children during locomotor development in the first year of life. Children can lag in the development of kinesiology, what is not revealed in time. Children with ICP can not master simple physiological movement patterns and stereotypes pertaining its timeframe that they should manage in the individual development period to one year of their life. Their psychomotor development is limited, slow and depends on the timely and correct diagnosis and subsequent therapy. In most children it is most often an obstacle restraint. Rehabilitation plays a major role and includes all of its complexity. It uses a variety of methods and procedures to achieve a desired effect on disability. Constantly exercise with your child is very important. What is important is to inform family members and their cooperation with doctors specialist and physiotherapists. ICP limits the handicapped for whole life. Even the lightest forms always shows some sign of disability. The survey deals with influencing cerebral palsy in children by way of physiotherapy with the use of various elements of rehabilitation methods. The survey uses a sample of children with a ISP diagnosis, in which the effects of comprehensive rehabilitation are compared and they are subsequently evaluated (Čálik, 2015).

Infantile cerebral palsy

ICP is the second most common neurological disorder in childhood and was called Little's disease, according to the London doctor John Little, who described the disease in 1859 as the first. It is described as a central movement disorder caused by the damage to the immature brain (Alagesan, Shetty, 2010; Kovacs et al., 2010). It is a chronic encephalopathy, neurodevelopmental and nonprogressive disability of the motor development of the child which arises on the basis of already completed and racing prenatal, perinatal, but also post-natal brain damage. It leads to neurological disorders. These damages incurred during the prenatal, perinatal and postnatal are not stationary, they tend to constantly evolve. Imaging tests may or will not be displayed clearly and find a trace of the disability. This may be a micro - and macrocephaly, hydrocephalus, porencefalis, agenesis of folds, lisencefalis and so on. In patients with ICP occur motor disorders,there are often violated other systems, the most common disorders are sensory – sight, hearing, and sensitive ones. Disorders are a reflection of diffusion or more – bearing brain damage. This damage to the developing brain is often accompanied by disturbed perception, communication, cognition, behaviour, epilepsy, hyperactivity, difficulties of emotional nature, secondary musculoskeletal problems (Fernandes et al., 2012; Kolar et al., 2012; Kovacs et al., 2010; Okálová, 2008; Ondriová, 2012).

Forms of cerebral palsy and its clinical manifestations

Cerebral palsy is characterized by a particularly dominant movement disorders that causes the greatest problems of disabled persons and is mostly noticeable in the earliest stages of the disease. For the most children with cerebral palsy a brain injury is already shown during the birth, their manifestation is an abnormal neurological findings, pathological ultrasonography finding on brain or convulsions. CNS controls the movement and this is why physical activity is directly related to the central nervous system. Character of movement disorders is determined primarily by disability of specific area. This is the number of various CNS disorders, which are reflected in the afferent and efferent pathways, including sensory, often are also mental disorders. These may be individual or in various combinations. The character of the clinical picture is also the differential feature of cerebral palsy form. As the brain matures, disorders develop and have a different prognosis, different assumptions to the emergence of joint deformities, contractures, then the abnormal muscle tone is present, position, psychomotor development is delayed, sub-standard gait, disturbances in behavior, delayed speech development and different response to the same therapies (Kovacs et al., 2010; Kolar et al., 2012; Pfeiffer, 2007; Véle, 1997).

Spastic form of cerebral palsy

It represents about 70% of total CP. It is characterized by an abnormal increase in muscle tone, spasticity with "phenomenon with a folding knife" on the limbs. Spasticity is seen as an overreaction to the tension. The tendon – periosteum reflexes with the presence of pathological symptoms such as Babinski reflex or Rossolimo are highlighted. Spastic forms on the basis of location of disability are divided into:

- spastic quadriparesis
- spastic triparesis
- spastic hemiparesis
- spastic diparesis (Kolar et al., 2012; Bobath, 1997).

Unspastic form of cerebral palsy

Characteristic feauture of the disease is muscle weakness overall - a global hypotonia (Rusnak, 1982; Kudláček, 2012). Unspastic form is divided into:

- hypotonic
- cerebellar
- dyskinetic
- athetoid

Complex rehabilitation treatment of children diagnosed with ICP in Renona Rehabilitation

- **The Kids**

The medical and rehabilitation programme Renona Kids is used to treat children from 2-3 weeks of age until the age of 3 years, and is also suitable for older children with height only up to 80 cm. Renona Kids takes 3-4 hours a day for a maximum of 12 days, but visible effects on the patient can be seen already during the fifth or sixth treatment day. All exercises are done with assistance of experienced physiotherapists who perform exercises with the child from the accurately described starting positions according to the Vojta kinesiology method. It makes use of the knowledge of the therapies of Vojta, Bobath, Kabat and Brunkowa. This rehabilitation programme activates the central nervous system, purposefully provoking certain muscle groups and creating muscle activity that produces optimal postures that are the basis for moving forward and focused motor skills. This targets the induction of reflexes such as crawling and turning, turning pathological reactions to physiological ones, and through this the children will advance in their motor development (http://www.renona-rehabilitation.com/rehabilitacnaliecba.html).

- **The Renona suit**

The principle of the treatment is a targeted correction of the patient's bodily posture and movements through the supportive and regulative effects of the suit.

The rehabilitation treatment conduces to a powerful normalizing flow of afferent pulses, with an impact on and regeneration of the affected function of the brain motor centre. Treatment by Renona space suits conduces to a great improvement of motional abilities of patients and also to reduction of the existing disorder.

The physiotherapist sets up the pressure power which is directed along the body axis. The therapist consequently calculates the pressure intensity and its proportion, depending on the weight, initial motional abilities, age and anamnesis of the patient. The pressure power reforms the position of individual segments of the trunk and lower limb motions. Through exercise and further repression of resistance we increase the activity of the postural position of muscles. The choice of a proper pull, functional correction and rotary motion of body segments is able to direct the flows of standardized impulses through the muscular and ligamentous apparatus in the central nervous system. The rehabilitation treatment performs the functional system of anti-gravitational and other system analysers in the brain, which is the basis for the development of physiological motions. Emotions are also developed in connection with this process, which can to some extent influence the intelligence and speech of the patient (http://www.renona-rehabilitation.com/rehabilitacna-liecba/renona-suit2/).

- **Hippotherapy**

In hippotherapy as in a rehabilitation method we use a comprehensive treatment of the horse with human exposure. It belongs to the most widespread forms of animotherapy, meaning ompact of animal to a human as a form of treatment. In addition to proprioceptive, visual, tactile and smell sensation, it activates also subcortical and cortical mechanisms. Those involved in managing the motor. It ranks among the facilitation methods, where is a re-education in which there is achievement of lowering the threshold of excitability of the motor neuron. Consequently, it increases the excitability of neural structures, thus facilitating the movement. It facilitates the global pattern of automatic control of the body and its position in hippotherapy. It conditions the proprioceptive sensory afferents. It comes to the activation of muscle groups movement promoted synergies daisy chain. Thanks to them the akranes FIXUM punctum and torso punctum are mobile. The main task is to influence postural affecting the overall condition of the body. This indicates all the motor skills of man. Hippotherapy action is occurring:

- facilitation of posturoreflexive mechanisms
- normalization of muscle tone
- coordination of movements
- rhytmisation of the body
- pathological distortions and creating new movement patterns
- re-education of walking and its promoting to the center
- affect of spastic.

With the hippotherapy we may begin with children in age of only several months because postural function matures up to three years of life (Benetinová, 2000; Hollý, Hornáček, 2005; Hornáček, 2004).

- **Climbing therapy**

It consists of elastic ropes of various flexibility which are connected to the hip belt. The belt fixates the pelvis and lower extremities of the treated patient.

The therapy is performed in a specially adjusted cage which enables independent and at the same time controlled movement as well as strengthening of affected parts of the body. The desired effect is conditioned by using the combination of Renona “Climbing Therapy” and Renona “Suit” costume.

The equipment allows the physiotherapist to prepare individual training for each patient.

With Renona “Climbing Therapy” we achieve improvement of balance and body posture in space. It may be combined with other exercises; in children it is performed in particular by means of playing.

With Renona “Climbing Therapy” we try to reduce the CNS disorder manifestations, in particularly in patients suffering from infantile cerebral palsy. Our exercises, which are part of the Renona “Climbing Therapy”, are based on the exercises of Berta and Karel Bobath. Using our therapy, we may weaken and in the end remove pathological neurological responses that restrain development of correct mobility patterns or their reconstruction/following a stroke, trauma, surgery/ in older age. With correctly performed Climbing training in Renona suit we try to set up physiological neurological responses that ensure correct coordinated movements of the body hand in hand in cooperation with the vestibular apparatus of the ear (http://www.renona-rehabilitation.com/rehabilitacnaliecba.html).

- **Snoezelen therapy**

Snoezelen is a method offered by Renona Rehabilitation Centre in a pleasant ambient, in a specially furnished room, and is provided using lighting and sound effects as well as scents.

It is applied to patients with polio, mentally retarded or autistic patients, children with Down syndrome, or pre-maturely born children. This multifunctional method is suitable from the earliest age of a child. It offers activities stimulating the children´s senses. A child may choose from offered possibilities the ones he or she finds pleasant and the therapist stimulates the choice so as to make use of the senses in a comprehensive manner to gain new experience. The aim of the method at Renona Rehabilitation Centre is to relax the patient, stimulate his or her senses and develop the personality. Children learn not only to perceive surrounding objects, but also to express their feelings.

When using this method, Renona Rehabilitation Centre respects patient´s own rhythm, intensity of his or her perception, and the therapy is adjusted to the patient´s taste and objects he or she finds pleasing. Nice atmosphere is induced through music, lights and scents. The Snoezelen method stimulates all senses. It is important not to abruptly terminate the peaceful atmosphere created in this room, but finish the treatment gradually and slowly.

Renona Rehabilitation Centre applies individual approach to each patient when using this method. The patient experiences personal contact with the physiotherapist, which helps their better communication (http://www.renona-rehabilitation.com/rehabilitacnaliecba.html).

- **Laser therapy**

By laser therapy with the aid of photon stimulation the noticable health improvements are achieved, spasticity is reduced. It stimulates the healing process by supporting ligaments. It also supports microcirculation and indirectly stimulates cell metabolism. Cell division is more intense, it improves the production of collagen and elastin. With the laser we achieve faster regeneration of damaged nerve fibers and stimulation of bone fibre to be recovered more quickly. It is suitable to apply laser to the trigger points reflex locomotion, motor points of paresthetic muscles and flat tummy of spastic muscles. The advantage is the use of laseropuncture. The application of the laser increases the metabolism of skin by activation of hair follicles. Laser effects are anti-inflammatory, analgesic, anti-oedematous and biostimulative (Guth et al., 2011; Kraus, et al., 2005).

- **Quantum therapy**

Quantum therapy is based on the application of electromagnetic radiation, quantum information processes and wave properties of living matter. The principle is by numerous factors simultaneously. It is a coherent pulse (continuous) laser radiation, pulsed incoherent infrared radiation, visible radiation vibrant red color and constant magnetic field. Application of quantum therapy, optimum use of medication shortens the duration of treatment of a wide range of diseases, reduce the dose of prescribed medication, or achieve their complete absence. It has a high prophylactic potential. Clinically, we support the immune, nervous and hormonal systems, contribute to the formation of new collagen in the joint structures and on the skin, improves micro and macro circulation, increases the production of cellular ATP and thus the energy level of cells and the entire organism and are also reducing or even eliminating pain, affects anti-inflammatory and anti-oedematous, the advantages of quantum therapy is non-invasive, ecological safety and without side effects (http://www.renona-rehabilitation.com/rehabilitacnaliecba.html).

- **Craniosacral therapy (CST)**

Craniosacral therapy (Cranium=skull=sakrum sacrum) is a gentle, non-invasive manual technique. The therapist gently touching tunes craniosacral rhythm, pulsing improves the cerebrospinal fluid – CSF, thereby affecting movement functions, thinking and emotions of the patient. It is a holistic, gentle but very effective treatment. CST generally contributes to stimulating and harmonizing the physical and mental forces of the individual. It can be applied as the short duration nature of acute or chronic patient. Natural self-regulation skills to help improve the functioning of the brain and spinal cord, and other systems associated with the CNS – the immune, hormonal, neuromusculoskeletal, vascular and respiratory systems. Therapy brings deep physical and emotional release and currently self-sanitation processes of the body. By CST we achieve balanced autonomic nervous system and the establishment of favourable changes in the systems of fluid (cerebrospinal, cardiovascular, lymphatic and cellular), promotes fluid flow, vitalization of organs, strengthen the immune system. With CST we achieve balanced right and left hemisphere of the brain, cranial nerves restriction, elimination of tension in the body system, bones and muscles, relieve blockages arising effects of trauma injuries. It also affects hyperactivity (http://www.renona-rehabilitation.com/rehabilitacnaliecba.html).

- **Kinesiotaping**

Kinesiotape is cotton, elastic, non-allergenic and waterproof tape, which does not restrict the movement of individual muscles. It helps patients in terms of stimulation or inhibition of certain muscles or muscle groups, which in turn are presenting the correct position and thus increase the effect of rehabilitation. Kinesiotape is also used to relieve pain, inflammation, to reduce muscle fatigue. It is however important to note that taping must be applied correctly. In our center we apply it to patients after consultation between doctors and physiotherapists. It all depends on the disability and health status of patients treated (Kobrová, Válka, 2012).

- **Stimulating massage**

Massage action can be described as a complex process. Its application before exercise positively affects the disease process and the changes it caused. Effect affects endocrine and lymphatic systems. It has a positive effect on the tissue supporting apparatus, the autonomic nervous system, internal organs and the human psyche. Before exercise there is applied stimulating massage, which aims to 'prepare' muscle performance. (Hupka et al., 1993; Storck, 2010).

- **Relaxation Massage**

Its application after exercise positively affects the disease process and the changes it caused. Effect affects endocrine and lymphatic systems. It has a positive effect on the tissue supporting apparatus, the autonomic nervous system, internal organs and the human psyche. After exercise it is appropriate to apply a relaxing massage at the speedy recovery of muscle (Hupka et al., 1993; Storck, 2010).

- **Bioptron therapy**

This therapy is one of the supporting therapies used at Renona Rehabilitation which we practice daily during the 12, 18 and 24-day rehabilitation programmes. It uses polarized light with a certain wave length which penetrates tissues and starts the own regeneration of the organism. The main effects of the polarized light used to treat our patients are: myorelaxation (elimination of myotonia), analgesic effects (against pain), anti-inflammatory effects, bio stimulation (healing processes, strengthening of immunity, better blood circulation, elimination of fatigue, tiredness etc.), effects in case of neurological difficulties (after apoplectic seizure, epilepsy); traumatological problems; or to strengthen and stabilise joints, ligaments or cartilages. The Bioptron lamp has a wide range of use; therefore we try to use its maximum effects individually for every patient (http://www.renona-rehabilitation.com/rehabilitacnaliecba.html).

- **Cryotherapy**

Cryotherapy operate the weakened muscle groups in terms of their stimulation, these muscles are stimulated through the cooling and thus leads to their activation and strengthening (http://www.renona-rehabilitation.com/rehabilitacnaliecba.html).

- **Thermotherapy**

By applying a positive local thermotherapy we operate the spastic muscle thermal stimuli relaxation, achieve their release and reducing contractures (Osacká et al., 2007).

- **Mud wrap**

This is a single application dioxide wrap, which contains many minerals that is released from the semi-permeable bag, and by penetration through the skin are brought nutrients to the tissue. The muscles more quickly regenerate (http://www.renona-rehabilitation.com/rehabilitacnaliecba.html).

- **Oxygen therapy**

Treatment is oxygen, which is performed in Renon Rehabilitation Centre in conjunction with music therapy, which helps us to develop and stimulate brain activity (http://www.renona-rehabilitation.com/rehabilitacnaliecba.html).

- **Clinical speech therapy**

Within the speech therapy care, we provide complex diagnostics, targeted intervention and prevention with patients with disrupted communication ability. As a part of intervention, we provide counselling for family members and communication partners of our patients. We provide individual approach to all our patients, focusing on specific areas of problems. The Renona Rehabilitation programme uses a model of complex care with the aim to maximally develop the communication ability and all the participating subsystems. We care about the well-being of our patients and their family. Therefore, we focus on the cooperation with the closest family members. We want the targeted therapy and re-education continue after the therapeutic stay in Renona Rehabilitation, to maximise the efficiency of speech therapy intervention. The target group are mainly children with cerebral palsy, post-traumatic and Cerebral Vascular Accident patients, who suffer from delayed or disrupted speech development, dysarthria, aphasia, speech disorders, hearing disorders etc (http://www.renona-rehabilitation.com/rehabilitacnaliecba.html).

METHODOLOGY OF WORK

The survey sample was used for the pediatric age in number twenty. Age of patients ranged from 3 to 16. All patients were diagnosed ICP. Patients completed a twelve-day stay at a rehabilitation centre Renona – rehabilitation, the main subject of rehabilitation was: cryo – thermo therapy, stimulating massage, exercise in Renona – suit, Renona Kids exercise, relaxation massage, bioptron therapy, mud wraps, oxygen therapy, hippotherapy, laser therapy, quantum therapy, Snoezelen, climbing, KST, clinical speech therapy and kinesiotaping. Each patient undertook input and output measurement, angle measurement are in degrees:

- **Flex arm joints**

The measurement is done lying down on a solid surface actively.

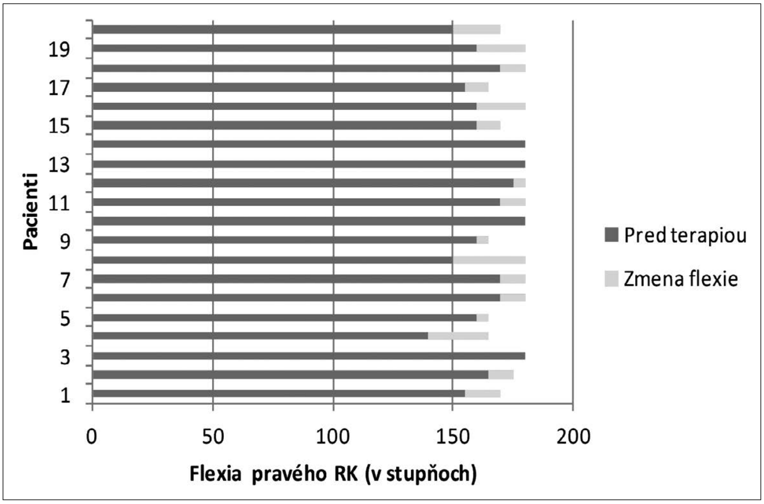
- **Flex hip flexion at the knee**

The measurement is done lying down on a solid surface actively and passively. For precision of measurements it is important parallelism of arm protractors moved by sections.

- Active and passive flexion and extension of the knee joints. The measurement is done lying down on the solid surface.
- Measurement of active and passive dorsal and plantar flexion in the ankle The measurements were made on the solid surface.

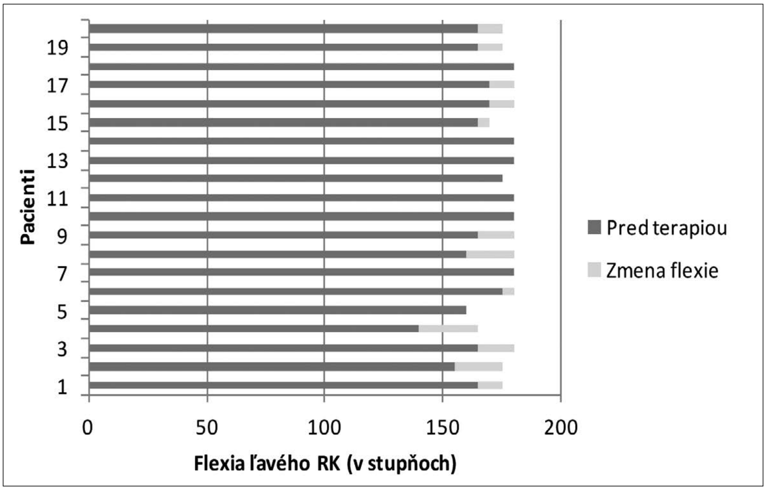
Data were obtained from the rehabilitation center Renona – Rehabilitation, Šúrovce, collected in the timeframe from 2011 to 2016.

For statistical processing of the measured values was used Excel, 2010.



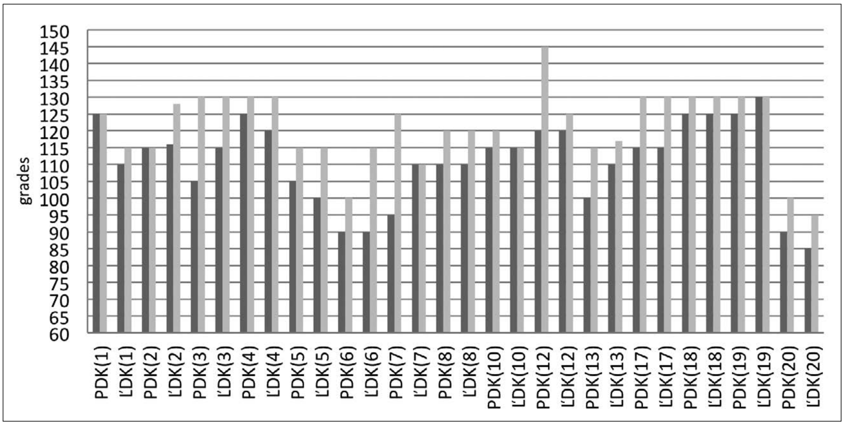
Graph 1 "Flexion right arm joint"

Explanatory notes to Graph 1: RK – arm joint, blue colour – flex before therapy, orange colour – change of flex.



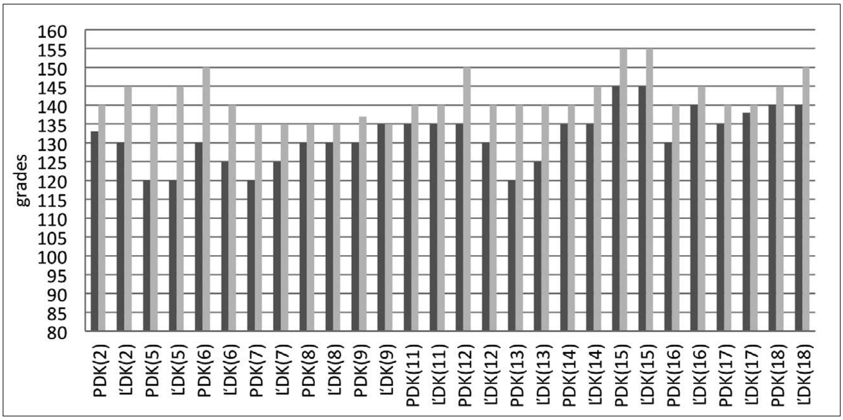
Graph 2 "Flexion left arm joint"

Explanatory notes to Graph 2: RK – the arm joint, blue colour – flex before therapy, orange colour – change of flex.



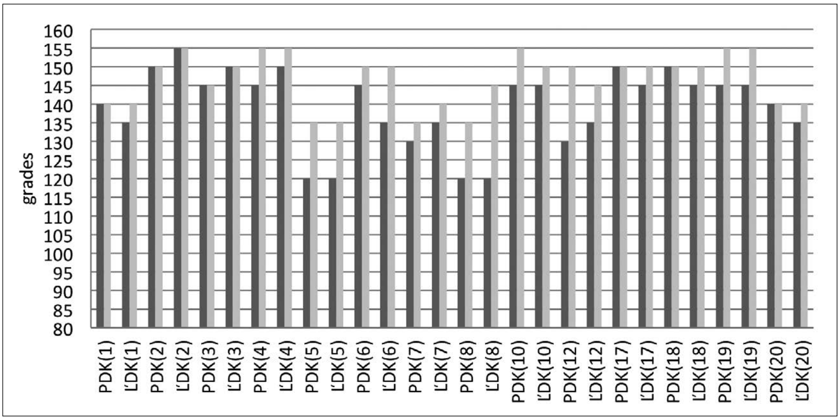
Graph 3 "Flexion hip – active"

Explanatory notes to Graph 3: PDK – right leg, ĽDK – left leg.



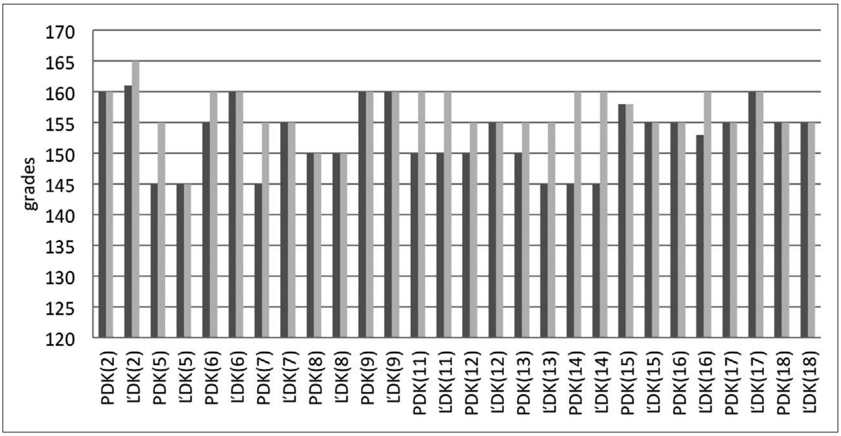
Graph 4 "Flexion hip – passive"

Explanatory notes to Graph 4: PDK – right leg, ĽDK – left leg.



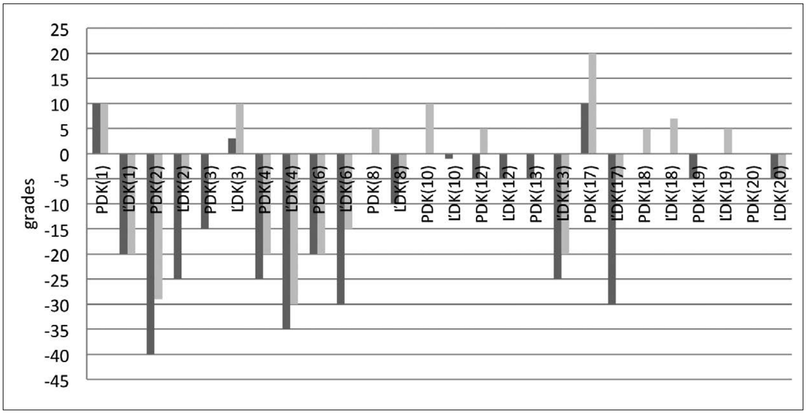
Graph 5 "Flexion of the knee joint – active"

Explanatory notes to Graph 5: PDK – right leg, ĽDK – left leg.



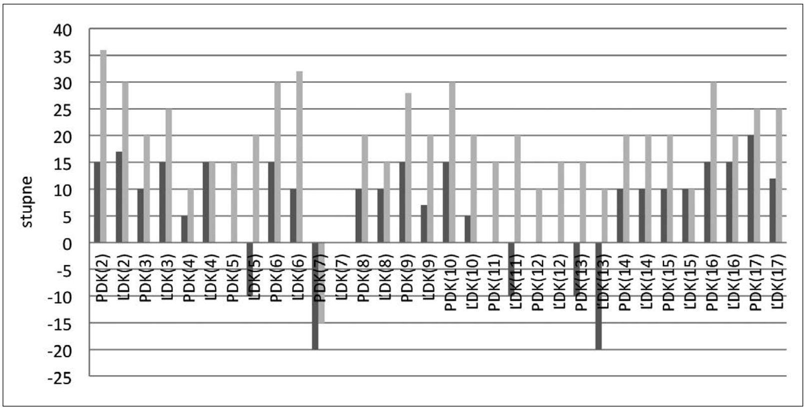
Graph 6" Flexion the knee joint – passive"

Explanatory notes to Graph 6: PDK – right leg, ĽDK – left leg.



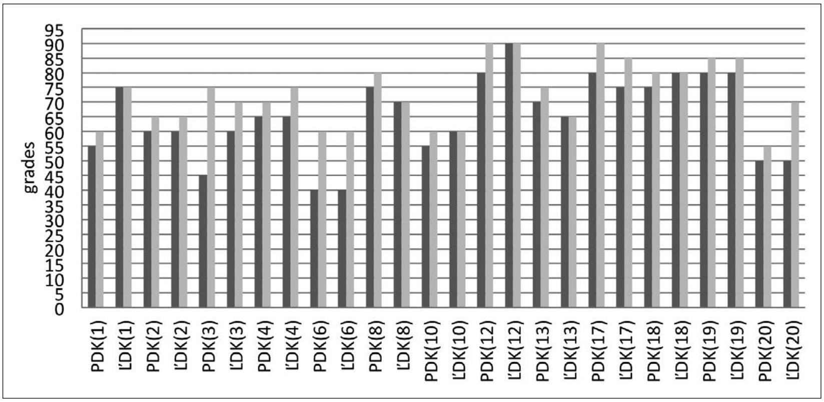
Graph 7 "Ankle joint – active dorsal flexion"

Explanatory notes to Graph 7: PDK – right leg, ĽDK – left leg.



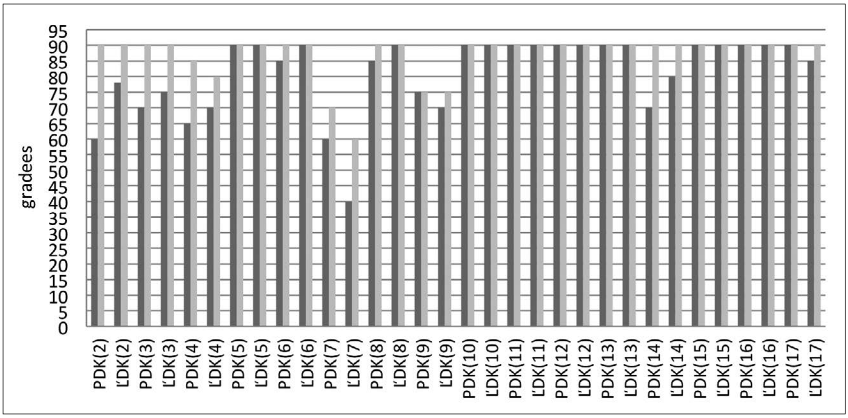
Graph 8 "Ankle joint – passive dorsal flexion"

Explanatory notes to Graph 8: PDK – right leg, ĽDK – left leg.



Graph 9 "Ankle joint – active plantar flexion"

Explanatory notes to Graph 9: PDK – right leg, ĽDK – left leg.



Graph 10 "Ankle joint – passive plantar flexion"

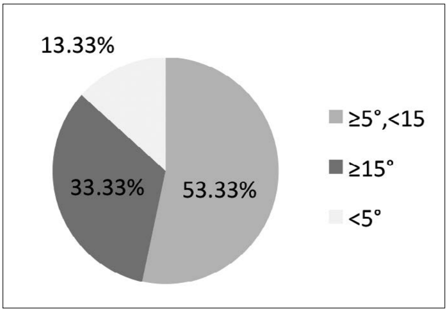
Explanatory notes to Graph 10: PDK – right leg, ĽDK – left leg.

Percentage evaluation:

Right hip

Improving mobility observed in the ranges:

- 15 ° and more
- 5 ° inclusive to 15 °
- less than 5 °



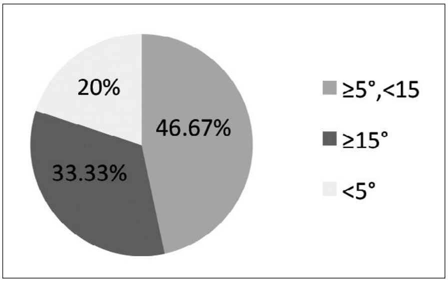
Graph 11 "The improvement of the range of movement in the right hip"

MEAN: 11.33; MODE: 5; Median: 10; VAR: 78.22; STDEVA 9.15.

Left hip

Improving mobility observed at intervals:

- 15 ° and more
- 5 ° inclusive to 15 °
- less than 5 °



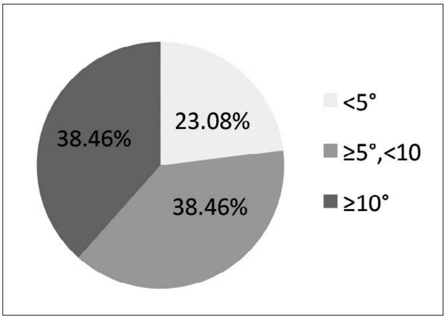
Graph 12 "The improvement of the range of movement in the left hip"

MEAN: 8.93; MODE: 5; Median: 10; VAR: 44.73; STDEVA: 6.92.

Right ankle joint – active dorsal flection

Improving mobility observed at intervals:

- less than 5 °
- 5 ° inclusive to 10 °
- 10 ° and more

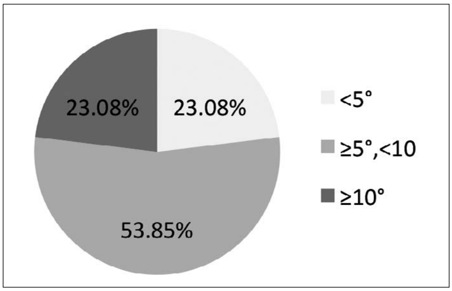


Graph 13 "The improvement of the range of movement in the right ankle joint"

MEAN: 6,23; MODE: 5; MEDIAN: 5; VAR: 20,49; STDEVA: 4,71.

Left ankle joint – active dorsal flection
Improving mobility observed at intervals:

- less than 5 °
- 5 ° inclusive to 10 °
- 10 ° and more



Graph 14 " The improvement of the range of movement in the left ankle joint"

MEAN: 7,69; MODE: 5; MEDIAN: 5; VAR: 54,21; STDEVA: 7,66.

CONCLUSION

The aim of the survey was to determine whether there is after the application of rehabilitation therapy improvement of the range of movement of selected joints of the lower and upper limbs. Improvements range of movement were recorded in all patients at the right and left upper arm and both legs. Dobrovodská states that in the measurement range of movement of the upper limbs became better range of movement in the shoulder joints in nearly all patients (with the exception of two but the deterioration of the range of movement is not noticed) (Dobrovodská, 2016). By measuring range of movement of the hip, we found that about one third of patients there was quite a significant improvement of mobility, the improvement of mobility of patients occurred also at the knee joints. It also improved the mobility of the ankle joints in the majority of patients in mentioned sample.

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THE EFFECTS OF EARLY REHABILITATION ON COGNITIVE STABILITY IN CHILDREN WITH SPASTIC CEREBRAL PALSY

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SUMMARY

Aim: To examine cognitive stability in children with spastic cerebral palsy.

Method: The study included 152 children with spastic cerebral palsy (CP), between ages of 6,0 and 14,6, who started habilitation treatment at the Special Hospital for Cerebral Palsy and Developmental Neurology in Belgrade before they turned one year of age. Children with epilepsy, quadriplegia and total FIQ<70, as well as with partial IQ (VIQ or PIQ) <80 were exempt from the study. Verbal IQ, performance IQ and full scale IQ were observed as target variable. The age included in WISC test, as a measure of the time elapsed from the occurrence of injury, functional status of fine and gross motor skills, the presence of visual impairment, retardation in early psychomotor development (PMD), residing at home or infirmary as an indicator of social environment were observed as potential independent variables.

Results: Most of these variables showed a certain degree of relation with the WISC basic measures, especially with the FIQ and PIQ, while VIQ demonstrated independence from these factors, except being in connection with early PMD. Visual impairment and early psychomotor development proved to be a more important determinant of later cognitive ability than motor disorders. Effects of age, expressed through higher scores of FIQ in younger children than in older, were significant when the age was analyzed in combination with the status of visual perception. Social environment did not appear significantly associated with any variable.

Conclusions: Considering the type of data that were available, these findings are rather seen as guidelines for future work than as unequivocal suggestion for making broader conclusions, but they certainly indicate the need for more systematic monitoring and stimulation of cognitive maturation of these children from the beginning, through the different stages of development, more specific early habilitation procedures, as well as for a greater degree of focus on the socio-psychological aspects of their maturation.

Key words: spastic cerebral palsy, general intellectual ability, time elapsed from the occurrence of injury, visual impairment, early psychomotor development

INTRODUCTION

Although cerebral palsy (CP) is a very broad and diffuse nosological qualifier which includes various forms of clinically manifested motor disorders of heterogeneous ethiopathogenesis (excellent review in Ashwal et al., 2004), it also designates proportionally particular situation of early static brain injury that is recognizable and often accompanied by cognitive limitations (Fennell & Dikel, 2001; Murphy, Yeargin-Allsopp, Decoufle & Drews, 1993; Nordmark, Hagglund & Lagergren, 2001), and literature offers precise information about their distinctive and disharmonious profile (Olsen, Pääkkö, Vainionpaa, Pyhtinen & Jarvelin, 1997; Pirillo et al., 2004, 2007). However, when cognitive development is viewed as a function of the time that elapsed from the occurrence of injuries (typically, in the period preceding the birth or around it), in other words, when the abilities of children with CP are observed from the perspective of child's overall experiential participation and learning while growing up, the findings are becoming less consistent: while some suggest that abilities of this population, general or in specific domains, decline over time (for example, Banich, Levine & Kim Huttenlocher, 1990; Daghlen Sandberg, 2006; Gonzales-Monge et al., 2009; Levine, Kraus, Alexander, Suriyakham & Huttenlocher, 2005), others assume their relative stability (Muter, Taylor & Vargha-Khadem, 1997; White & Christ, 2005). In the context of observation of lesions and their consequences as essential factors for further cerebral maturation and development of future interaction in general, one can assume a number of factors that could potentially influence the findings, including, as a minimum, the type, extent and localization of the lesion itself (Ashwal et al., 2004; Krageloh-Mann, 2007), 'initial' quality of interaction with the environment (Biagioni, Bartalena, Boldrini, Pieri & Cioni, 2000; Chilosi, Cipriani, Bertuccelli, Pfanner & Cioni, 2001; Goodman & Yude, 1996) but also, more specifically, the presence of motor and sensory limitations, starting from the first days of the child's life (Guzzi et al., 2001; Jakobson, Ek, Fernell, Flodmark & Broberger, 1996).

There is a growing recognition of the role of social participation as part of an integrated and stimulating cognitive development and vice versa, as well as progress in understanding how its deficiency can slow the development of cognitive functions and abilities (Aylward, 2002 Liptak & Accardo, 2004; Morris, Kurinczuk, Fitzpatrick & Rosenbaum, 2006). In order to get a better understanding of cognitive impairment in children with spastic CP, it is necessary to determine how limited participation in social activities influences their cognitive development (Ladd, 1990). Speech and language disorders affect the level of participation in various activities at school, during classes and breaks (Schenker, Coster & Parush, 2005a, 2005b). General cognitive functioning (expressed through IQ) may indicate the gravity of neurological problems (Goodman & Graham, 1996), i.e. it may indicate the slow maturation or lesion of the neural system which can cause problems in social adjustment and building positive social relationships (Nadeau & Tessier, 2006; Yude, Goodman & McConachie, 1998). This also applies to the executive functions that are most responsible for processing information relevant to social skills, as well as for visual perceptiual damage (Schenk-Rootlieb, Van Nieuwenhuizen, Schiemanck, Van der Graaf & Willemse, 1993). Developmental psychology has a long tradition of studying the impact of children's social participation and interaction in cognitive development and acquisition of knowledge and skills (Piaget & Inhelder, 1998; Rogoff, 2003). The basic condition for building an image of the world is the child's active participation in the social context in which he or she adopts various mental skills necessary for understanding scientific concepts and performing mathematical operations, which in turn enables a child to participate in new ways in new, different situations thus encouraging his or her cognitive and social development. Neuroconstuctivist dynamic interactive model (Botcher, 2010; Gottlieb, 2007) takes into account the lesions of the brain and particular neuropsychological impairments, their impact on cognitive functions, which have implications for social participation, which affects the development of cognitive functions and their impact on the reorganization of the brain regions.

It is essential to find out more about the interaction between biological maturation and cognitive development and learning through participation in social situations, so that we can explain the possible development trajectories in children with spastic CP.

In this paper, we were interested in late cognitive abilities of children with CP and whether some of the potentially important factors can be singled out as particularly influential. Our analysis included the functional motor status (fine praxis skills and gross motor skills, and control posture), visual status, the impact of early psychomotor development and the impact of socio-psychological factors depending on whether the child develops within the family environment or reside in the Hospital's infirmary.

METHOD

Subjects

This retrospective study included 152 children with spastic cerebral palsy who underwent the habilitation treatment before they turned one year at the Special Hospital for Cerebral Palsy and Developmental Neurology in Belgrade, excluding children with epilepsy (in order to satisfy the prerequisite of static early injure), of ages between 6,0 and 14,6 at the time of cognitive testing (done in the period from 1994 to 2014). In addition to restrictions on spastic CP, the sample included only children with approved prenatal or perinatal etiology of disease and with normal to near-normal intellectual abilities (IQ with a total score of 70 or higher, or partial (PIQ, VIQ) coefficient of 80 or more). The reason for the introduction of partial IQ quotients as an additional criterion in the formation of the group is often emphasized VIQ-PIQ discrepancy in this population, which may lower the overall IQ score by more than two standard deviations below the expected value for the age. The study included only children with hemiplegia or diplegia, since application of performance tasks in composite intelligence test is not possible in children with quadriplegia. All children had early ophthalmologic and audiometric reports, but only 76 children had a certificate of early psychomotor development testing (Munich Functional Development Diagnostics or Brunet-Lezine scale), so, this reduced sample was used in the analysis that concerned early psychomotor status. Since only a negligible proportion of children in the sample had CT/MR report, 'risk-factors', such as gestational age, weight and Apgar score, were controlled and monitored, but since none of these, especially the maturity of the fetus at birth as a potential, indirect marker for lesion ethiopathogenesis (Ashwal et al., 2004; Okumura, Hayakawa, Kato, Kuno & Watanabe, 1997), showed no significant correlation with achievement on tests of cognitive ability, they were not mentioned in further elaboration.

Procedure

General intellectual abilities of these children were assessed with WISC. The study covered only those test protocols which were given and evaluated in accordance with modern requirements of psychological assessments of the persons with physical and/or sensory impairments (Briggs, Dial, Morere & Joyce, 2007). However, even after the necessary modifications some problems of administration, evaluation and interpretation of the results in this population remain, primarily due to motor limitations (for example, in controlling the fine motor skills or due to forcibly altered lateralization of the dominant hand). Thus, here, in a case of time-limited subtests, none of the subjects, regardless of the presence, type and degree of impairment, did not receive extra points as a bonus for solving speed. Because for various reasons a number of subjects was not given a complete performance scale, the total number of subjects, whose PIQ was analyzed, was reduced to 119. In addition to this, due to incomplete medical history, not all subjects were analyzed using all the variables.

Fine motor skills were assessed using the Manual Ability Classification System (MACS), a method that allows a systematic functional classification of manual skills in children with CP when using objects in everyday activities (Bappsc, 2007; Eliasson et al., 2006). The scale assesses achievement in five ordinal categories. As all the children included in this study were assessed in the context of some of the first ('easier') three categories of the scale and because the number of subjects assessed in the third category was small (total of five), two evaluation were obtained: absent/discrete limitation of fine motor skills (MACS category 1) and mild limitation (MACS categories 2 and 3).

In assessing the gross motor skills, a similarly designed five-level scale, Gross Motor Functional Classification System (GMFCS) was used, based on the assessment of spontaneous movement with special emphasis on the control of the body and walking, with the primary criteria that functional differences between the level/category must be clinically significant (Morris & Bartlett, 2004). Estimated with this scale, gross motor skills of children in our sample varied between the first and fourth level, but these assessments were re-categorized in the dichotomous variable, where one group consisted of children with minimal/mild limitation of body control and independent movement (GMFCS 1 and 2) while other one consisted of children who must rely on apparatus (GMFCS 3 and 4).

As already mentioned, all children undrwent clinical ophthalmological and audiological examination. Data for sole subject with hearing impairments were excluded from further evaluation, while the vision test findings were divided into two categories – children who have no visual impairment or have only mild limitation of visual acuity corrected with glasses, and those who have other forms of visual-perceptual restriction, except previously singled out (typically, strabismus and amblyopia).

Since the findings of the applied the Munich and Brunet-Lézine scales were sometimes recorded only descriptively, only two-thirds of the children having them, the results were divided into the group with a normal or near-normal early psychomotor development and the group that corresponded to "borderline delay" or 'mildly slow' PMD.

Home/infirmary variable refers to the social environment in which children live most of the year. One group consists of subjects who live at home with their parents or guardians, while the second group consists of subjects who stay at the Hospital's stationary department during the school year where they reside, have their therapies and attend classes. From time to time, mostly during long holidays and school holidays, they go home.

Standard statistical methods for quantitative analysis compatible with the implementation of categorical independent variables were used in analysis of the results.

RESULTS

Descriptive data for all three IQ scores offered by WISC are presented in Table 1. The total IQ is displaced in relation to the expected mean by almost one SD downwards with positively skewed distribution of results: most scores are concentrated on the left side of the curve (Figure 1), which is partly the result of the criteria set for the selection of the sample. The difference between the means of VIQ and PIQ in favor of verbal ability is evident and not accidental (ANOVA for repeated measurements gives $F=54.382$, $p<0.001$, partial eta^2=0.315). As it was expected for this population, we noticed a high frequency of extreme discrepancy between achievements in the subscales: the number of children with a difference VIQ-PIQ being more than 20 points exceeds one-third of the total sample, while the largest recorded difference was as high as 52 IQ points.

Table 1 *WISC results*

	N	Min	Max	M	SD
FIQ	152	54	124	85.48	15.33
VIQ	152	61	135	90.73	15.70
PIQ	119	43	115	78.39	16.30

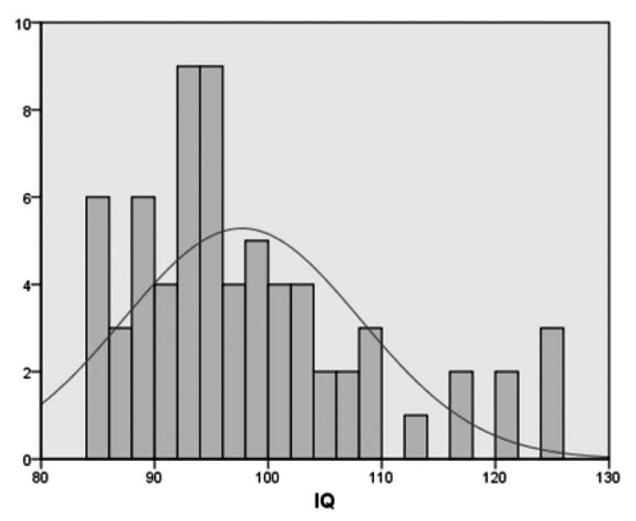

Figure 1 Distribution of IQ scores within the sample

Integrity of the motor skills, presence of the sensory (visuospatial) deficit and early psychomotor status of the organization show, individually, a distinctive influence on the obtained values of IQ scores, while social environment has no significant effect (Table 2).

Table 2 *Mean values of performance on WISC for examined predictors*

		MACS			GMFCS			vizPerc			rPMR			home/infirmary		
		M	SD	N**	M	SD	N**	M	SD	N**	M	SD	N**	M	SD	N**
FIQ	1.0*	87.55	14.98	47	86.24	14.80	70	86.25	13.93	71	89.00	15.58	45	84.30	14.20	88
	2.0	80.86	13.25	72	79.95	12.65	49	78.74	13.24	47	78.84	10.87	31	81.26	14.49	31
	Total	83.50	14.28	119	83.50	14.28	119	83.26	14.09	118	84.86	14.66	76	82.78	14.35	119
PIQ	1.0*	84.40	15.92	47	82.76	15.91	70	82.42	15.58	71	83.13	15.94	45	80.43	16.31	88
	2.0	74.46	15.41	72	72.14	14.88	49	71.70	14.98	47	75.06	16.92	31	82.58	16.02	31
	Total	78.39	16.30	119	78.39	16.30	119	78.15	16.16	118	79.84	16.72	76	81.51	16.16	119
VIQ	1.0*	92.00	16.84	47	91.24	16.36	70	91.44	16.04	71	96.02	16.10	45	90.25	15.67	88
	2.0	89.18	13.97	72	88.94	13.30	49	88.02	13.27	47	85.55	9.28	31	91.52	15.81	31
	Total	90.29	15.16	119	90.29	15.16	119	90.08	15.04	118	91.75	14.61	76	90.88	15.74	119

*for the independent tested variables, 1.0 denotes subgroup with a better status (preserved motor skills – MACS and GMFCS, visual percepcion – vizPerc, early psychomotor development – rPMR), while 2.0 denotes subgroup with poor status, except for the home/infirmary variable where 1.0 denotes home, and 2.0 infirmary.

**due to incomplete medical histories, some cases were not included in the analisis

Groups separated according to MACS and GMFCS differ significantly in value of FIQ and PIQ (respectively, $F_{2'150}=16.966$, p<0,001, eta^2=0,184 and $F_{2'150}= 16.794$, p<0.001, eta^2=0,183 for FIQ; $F_{1,117}=11.540$, p<0.001, eta^2=0,090 and $F_{1,117}=13.528$, p<0,001, eta^2=0.104 for PIQ), but not for VIQ; since the effects are small, two-way between groups ANOVA (MACS*GMFCS) produce results that fall just below the acceptable significance (respectively, p<0,189 and p<0,056 for FIQ, p<0.064 and p<0.077 for PIQ), although AS values decrease progressively for subgroups of children who have higher, i.e. both types of motor limitations. Similar effects are recorded when visual impairment is viewed as an independent variable (differences between groups for FIQ and PIQ are significant, respectively p<0,001, partial eta^2=0,192 and p<0,001, partial eta^2= 0,106, while not significant for VIQ: p<0,236, partial eta^2=0,009), with a slightly modified 'form' of the results when it comes to the findings of the early psychomotor development testing (for the dependent variable FIQ, a difference of 11,29 points is significant for p<0.001, partial eta^2= 0,141, and for PIQ it is slightly lower, AS(M1-M2)=8,07, p<0,038, partial eta^2=0,057), but contrary to the previous, the means of VIQ (average difference between AS=9,63) differ significantlyt (p<0,010, partial eta^2=0.097). By testing the interaction of the effects of the perception deficit, early PMD and MACS (which was selected last due to proportionally greater effect on FIQ and PIQ in relation to GMFCS) one gets a model (Figure 2) where the largest, although small, individual contribution to the subsequent FIQ is obtained through ePMD (p<0,004, partial eta^2=0,087) and then through visual limitation (p<0,047, partial eta^2=0,043), while the effect of MACF loses statistical significance (p<0,387, partial eta^2= 0,008). For PIQ, as the only important factor, with a slightly larger effect, presence of the visual perceptual damage stands out (p<0,004, partial eta^2=0,116), while for IQV early status of the psychomotor organization is the only important factor (p<0,003, partial eta^2=0,085). Although proportionally higher percentage of children with proper ePMD had no visual impairment (75:25%), it should be noted that Pearson Hi^2 for all three independent variables showed no statistically significant association (Hi^2=2,668, df=1, p<0,078).

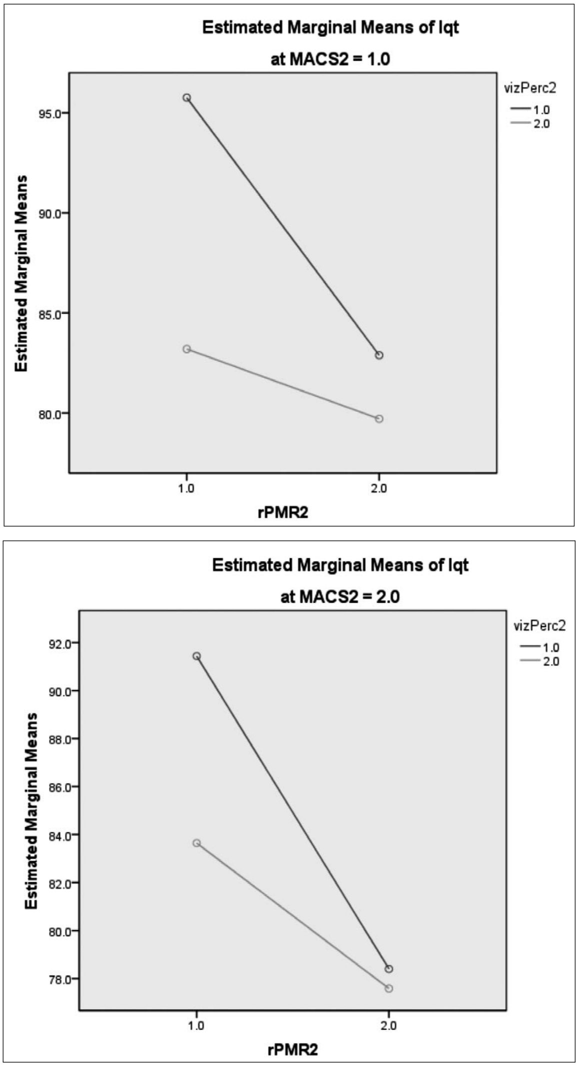

Figure 2 Mutual interactions of early psychomotor development (rPMR2), sensory deficit (vizPerc2) and fine motor skills deficiences (MACS) as dichotomous independent variables for the dependent FIQ (Iqt)

Age at testing of intellectual abilities with WISC, expressed in months, here observed as an indicator of the time elapsed from the occurrence of injury, manifested in the preliminary check its poor, but significantly negative connection with the obtained values of IQ (rho=-0,21, p<0,01; Figure 3). Although linear regression indicates that age contribution to the changes of FIQ is barely noticeable (part.R^2=0,03), Beta value of 0,189 possess statistical significance (p<0,02). Therefore we this transferred this variable into dichotomous one and tried to compare its impact with the previously isolated ‘predictors’ of the proportionally utmost importance for IQ among subjects, primarily, with the effects of visual and early PMD impairments. The established division border for groups of 8 years of age (96 months) is somewhat arbitrary and intuitively established, but beside the fact that the sample is evenly split (Nyounger:Nolder=75:76) this division roughly corresponds to the traditional assumption of Piaget on the period of transition to a higher operational intellectual level, but also to the neuropsychological record that suggests a qualitative change in the conceptual organization around this age (for example, Banich et al., 1990). Not quite beyond expectation, one-way ANOVA showed that the average difference between FIQ in younger and older children (87,31:82,83) is just below the level of significance ($F_{1,150}$=5404,069, p<0,055). However, when the effects of age at testing were checked along with the status of visual perception (presence or absence of visual impairment), its proportionate share in collecting variance increases to the level of significance (F= 5,495, p<0,02). However, visual perceptual status (F=13,196, p<0,001, partial eta^2=0,082) still affects significantly the differences between thus intersected groups, which are recorded in the range from AS=90,58 in younger children with better preserved visual perception to AS=76,85 in older children with greater vision impairment (AS residual values are 82,40 and 85,36). Similar effect of age is neither recorded in comparison with the findings of the early organization of psychomotor skills (ePMD remains the only significant factor in the model), nor when the other independent variable is preservation of fine motor skills (MACS maintains significance). Due to the low overall size of the obtained effects, such contrasts for PIQ were not checked since this sample was downsized by almost one fifth.

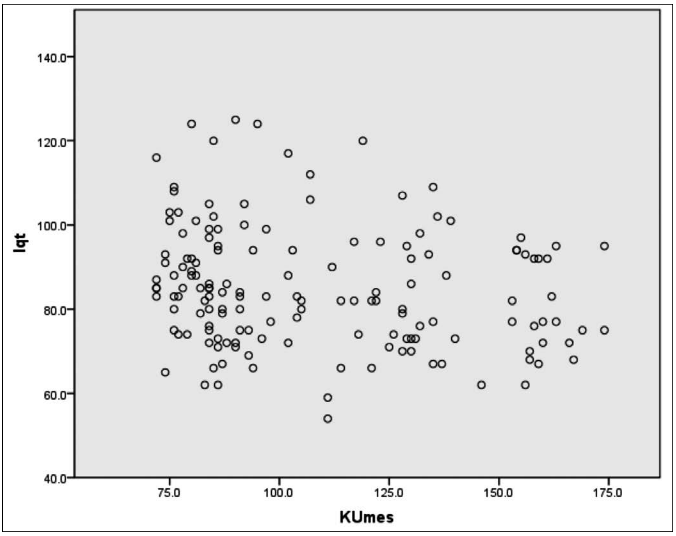

Figure 3 Individual achievement in FIQ (Iqt) depending on the age at testing with WISC (X axis – chronological age expressed in months – KUmes)

DISCUSSION

When we look at the cognitive development as a resultant of continuous dynamic interaction of biologically determined path of cerebral maturation and child's active selection and processing of environmental information that will modulate the growth (Quartz & Sejnowski, 1997; Thomas & Karmiloff-Smith, 2002), the presence of early brain injury can be seen as additional, important factor that interfere with these processes. Expression of disturbances that we may face in the child's everyday life is achieved through years of practicing a particular way of data processing and through fixation of neural representations of that processing (Karmiloff-Smith, 2009; Sirois et al., 2008). Plasticity of the immature brain, i.e. its increased predisposition to alter under various influences (Stiles, 2000), can lead to very different outcomes of an early structural damage, ranging from extremely favorable to those who have much worse consequences than comparable lesions of the mature brain (Forssberg, 2008; Karmiloff-Smith, 2002; Stiles, Reilly, Paul & Moses, 2005; Thomas, 2003). Since the understanding of the factors that cause one or the other outcome is a matter of vital importance, the research of the late consequences of the early cerebral lesions stands out as one of the indispensable approaches in an attempt to comprehend them better.

From this perspective, if the support we provide to these children is appropriate, then, at least in this group, for which we can assume that from the beginning had a slightly better development potential, we can expect proportionately better capabilities later. Research by Aram and Eisele (1994) points out possibility of stabilization of cognitive development over time through compensatory mechanisms and plasticity of the preserved brain structures. The authors studied children with unilateral spastic CP and found a normal or near-normal level of intellectual achievement in both groups (left-sided and right-sided damage). If the abilities of children with CP are 'stable' and do not change significantly to the level of mature cognitive organization, then one can expect that there is no significant connection between age and performance on the cognitive tests, i.e. average performance of younger and older children will not differ significantly.

The findings of the simple processing of basic measuring indicators in the test (FIQ, VIQ, PIQ) reflect the cognitive profile characterized by spastic CP where, in contrast to almost normal verbal disturbances, disturbances in visual perceptual organization appear as dominant (Ito, Araki, Tanaka, Tasaki & Cho, 1997; Pirillo et al., 2004), here represented by the extremely reduced scores on the 'manipulation' subscale. The age shows mild although consistent link with FIQ at the expense of older children. This connection is to some extent facilitated through the presence of early perceptual deficit. Other examined factors, although they make differences in one IQ level or another, did not show significant connection with this, and the only psycho-social variable, home/ infirmary, did not prove to be a significant factor.

Among many factors that are recognized as possible sources of atypical or altered cerebral, and thus cognitive maturation, we chose here (or we could choose) disturbances of sensory (more precisely, visual) organization, integrity of the motor skills, and (non)deviation of early psychomotor development, with the assumption that each of them represents a developmental factor that acts from the very beginning of the child's interaction with the environment. Additionally, visual-perceptual organization is a typical *locus minoris* in children with spastic CP (Barca, Cappelli, DiGiulio, Staccioli & Castelli, 2010; Scheiman, 1984; Stiers, Vanneste, Coene & Vandenbuscche, 2002), motor deficit is the essence of the diagnosis itself (for example, Bax, Goldstein, Rosenbaum, Paneth & Leviton, 2005), and delay in early psychomotor development is a relatively general indicator of the quality of early interactions with the environment, no matter how unreliable it may be considered (Chilosi et al, 2001; Romeo et al., 2016; Wood et al., 2005). Our results, in general, showed significant effects of each factor. However, the home/infirmary variable had no significant effects. We can assume several reasons. One of them is that children in the infirmary actually get a better stimulation than at home, i.e. if home conditions are of poor socio-cultural level, or if the parents are not ready (willing), or are not able to engage sufficiently in meeting their children's social, psychological and cultural needs. Further, similar to the previous, children with disabilities are still not fully accepted in their wider social environment, in contrast to the infirmary where they have a maximum commitment of the staff, as well as the social environment of peers with similar disabilities. The latter, the infirmary environment, may be an advantage but also a disadvantage. On the other hand, children who live at home may not meet their need for social contacts to the appropriate extent. In one word, home/infirmary variable proved insufficiently discriminative, but we think that this aspect should be given more attention in a future study, and the variable itself should be precisely defined and divided in a number of components.

A number of studies actually suggest that overall capacity in children with CP could decline over time, as observed for some other clinical groups, for example, in children with (specific) disturbances in cognitive maturation. So, for example, Levin and associates, in the paper focused on the children with congenital hemiplegia, tested with WISC in different intervals (1.5-15 years), before and after seven years of age, found that their IQ score decreased with time (Levine et al., 2005), while Gonzales-Monge and associates found for the same form of CP decline in PIQ only (Gonzales-Monge, 2009). Other authors record similar findings for particular cognitive abilities, as well (for example, Dahlgren Sandberg, 2006, for reading and working memory). In addition to generalized assumptions about the potential influence of early injuries to the development of interactions and the possibility of their gradual complication (eg, Stiles et al., 2005), one of the possible explanations for these findings is that the cerebral white matter lesions, the most common cause of spastic CP, may compromise the quality of transmission of information or interactions between different areas of the brain, and early impairments 'on the periphery' of cognitive processing may endanger the later maturing of higher cognitive functions (Anderson, 2007).

The importance of an early intervention aimed at changing this relation lies in the ability to incite stimulating reciprocal interaction between neurobiological constraints caused by early brain injury and neuropsychological potentials in the context of adequate social and psychological environment (Bottcher, 2010).

Reliance on standard clinical information, recorded in the medical and psychological documentation during treatment and health monitoring of children with spastic cerebral palsy, determined to a large extent the selection of variables, methods of processing, but also the overall design of the study. Therefore, our findings suggest that existing information can be useful when we talk about some current issues of cognitive abilities in this population. The cognitive profile of children with spastic cerebral palsy who have normal or mildly reduced general abilities is, as a whole, decidely atypical than suggested by the amount of total IQ score. The presence of sensory or motor limitations and retardation of early psychomotor development are seen as relevant factors for the future effectiveness of cognitive organization. There was also a negative correlation between age and overall intelligence quotient. Although the relative influence of each of these factors is proportionately low, they point to potentially significant issues in supporting these children. At an early stage the attention is mostly paid to stimulation of motor skills (through kinesy therapy), control and possible correction of vision and hearing are left to parents, while the development of visual perceptual skills and visual motor skills is not sufficiently monitored; early psychomotor development is not monitored systematically, and the importance of social participation is not emphasized and is not encouraged enough. Systematic monitoring of cognitive maturation through different stages of development, the introduction of neuropsychological assessment in the proceedings and focusing on the socio-psychological aspects of the child's development could significantly contribute to the quality of involvement of psychologists in this population. It is necessary to emphasize that the monitoring of cognitive development should begin in a timely manner (as soon as possible) and be continuous, and stimulation of cognition, particularly visuospatial organization in connection with early vision correction should begin as soon as possible. Social integration should be monitored by psychologists and special education teachers continuously from the beginning.

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CASE STUDY: EFFECTS OF LACKING EARLY TREATMENT IN JACOBSEN SYNDROME DUE TO LATE DIAGNOSIS SETUP

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SUMMARY

Jacobsen syndrome is a rare innate disorder which occurs due to a deletion on the long arm of the 11th chromosome. The deletion of various sizes leads to different phenotypes which can cause multiple dysmorphic features, thrombocytopenia, innate heart defect, intellectual disability of different degrees, insufficient skeleton development, ophthalmologic problems, urogenital anomalies and late motor skill delays. Over 90% of persons with this disorder also suffer from a disorder called the Paris-Trousseau syndrome characterized by the inability to coagulate blood and causes excessive hemorrhage and easy bruising. Persons who suffer from this disorder also have light cognitive dysfunctions, the receptive speech is almost normal, but they are having problems with the expressive speech. This syndrome was first described by Danish geneticist Petra Jacobsen in 1973. Up to day, there have been around 200 cases described in literature. The prevalence of this syndrome is 1:100 000 children, and the male:female ratio is 2:1 in favour of females. The diagnosis is most often set at birth or early childhood. The goal of our work is to present a case of a girl with this rare syndrome who has been diagnosed only at the age of nine. The study will present the significance of early diagnosis and early treatment on the life quality of persons suffering from this syndrome. We will try to point out to the lack of different skills with this girl which was caused by the lack of special education and speech therapy treatment in the early development.

Key words: Jacobsen syndrome, treatment, early diagnosis, motor skills development, special educator and rehabilitator

INTRODUCTION

Jacobsen syndrome is a rare genetic disorder caused by a deletion on the long arm of the 11th chromosome (Mattina, Perrotta & Grossfeld, 2009). Deletions of various sizes cause different phenotypes which can lead to a number of disorders (Grossfeld et al., 2004). This disorder was first described by Danish geneticist Petra Jacobsen in 1973 in a family in which several children inherited the misbalanced translocation of the 11th chromosome, and at least one parent had a balanced translocation of the 11th chromosome (Treiber, Vukovic & Kropivsek, 2015). Up to day, there have been around 200 cases described in literature. The prevalence of this syndrome is around 1:100 000 newborns, and the male:female ratio is 2:1 in favour of females (Mattina, Perrotta & Grossfeld, 2009). In most cases, this syndrome occurs as de novo, as a consequence of an error during the partition of reproductive cells, while the embryo is still in the womb. This syndrome is hereditary in a very small number of cases and is a result of the misbalanced inheritance from the carrier of the balanced translocation or mosaicism. Jacobsen syndrome is also referred to as the 11q syndrome (McClelland, Smith, Smith, Gray, Diack & Dean, 1998).

Literature teaches us that persons suffering from this syndrome often display slow psycho-physical development, growth arrest and specific facial expression (White, 2007). Most newborns with this syndrome also display a CNS disorder. This can affect the brain functions and the spinal cord function which can lead to study problems, motor skills, speech and intellectual functioning (Ono et al., 1996). Persons suffering from Jacobsen syndrome have problems with sitting down, walking, standing. Most often problems common to all persons suffering from this syndrome are compulsive behaviour, short attention span and weak concentration (Grossfeld et al., 2004).

Regarding the physical deformities, persons suffering from this syndrome display short growth and skull abnormalities. Skull abnormalities often include macrocephaly, trigonocephaly, microcephaly, high forehead and cheek asymmetry (Bajic & Radojkovic, 2007). Regarding other facial deformities, hypertelorism occurs around the eyes, low eyelids and cross-eyes; a broad nasal bridge occurs around the nose together with a flat nose base (Lee et al., 2004). The ears are set los and small. The mandible is small, the mouth is V-shaped, and the upper lip is thin. The neck is short and there are also braquidactillia, syndactylia, and clinodactillia (Bernaciak et al., 2008). Over 90% of persons suffering from this syndrome has a disorder called the Paris-Trousseau syndrome and is characterized by the inability to coagulate blood and causes excessive hemorrhage and easy bruising (Krishnamurti et al., 2001).

Other common problems occurring include heart problems and the congenital heart defects, kidney problems, gastrointestinal abnormalities, otitis media, frequent ear infections, sinusitis, and recurrent respiratory infections, genitalia abnormalities (Schinzel, Auf Der Maur & Moser, 1977). Newborns suffering from Jacobsen syndrome may exhibit nutrition problems. They often have to be fed through a feeding tube. Eyesight, hearing, immune system, and hormonal anomalies can also affect children with Jacobsen syndrome (Jones et al., 1994).

In persons with the typical phenotype, the diagnosis is setup using feature clinical symptoms which include the following: intellectual disability, special facial expression and thrombocytopenia. Apart from these, the diagnosis has to be confirmed using a genetic test called *cytogenetic analysis* (Manolakos et al., 2009). In around one half of children with this syndrome, the diagnosis is setup during the first year. In the second half, especially with children whose symptoms are less prominent, the diagnosis is setup somewhat later (Penny et al., 1995). The differential diagnosis can occur due to thrombocytopenia in relation to the Nooan syndrome and Turner syndrome. Sometimes, the differential diagnosis can occur due to intellectual disability, palpebral fissures, short stature and fingerpads in relation to the Kabuki syndrome (Neavel & Soukup, 1994).

Nearly 20% of the children die within the first two years. Most often death causes include innate heart conditions (95%) and, in a smaller percentage, hemorrhage. Apart from this, their life span is not familiar (Maas et al., 2008).

An entire team of experts which usually includes a pediatrician, child cardiologist, neurologist, ophtalmologist, orthopedist, physiatrist, special education teacher and speech therapist is required to work with children suffering from this syndrome since the earliest period (Noreuil, Welch & Lange, 2007).

Case study overview

At the moment of conducting the study, the girl was 10 years and two months old. The Jacobsen syndrome diagnosis was setup when she was nine years and seven months. Based on the insight to her medical history and documentation, the girl has multiple anomalies and motor and cognitive skill disabilities. She was born in the 36th week of pregnancy, third child from the third risky pregnancy. It was natural childbirth with an APGAR score of 9. Older daughters are normal in growth and development, without any disorders. The family history contains no specialties in the last three generations. The grandmother on her father's side had a heart murmur and there were cases of middle-aged patients with heart conditions. At the moment when the girl was conceived, the mother was 24 and the father 30.

Immediately upon birth, the equinovarus type of the right foot deformity was noticed in the girl (Equinovarus is a congenital deformity involving one foot or both. The affected foot appears to have been rotated internally at the ankle. Without treatment, people with eqinovarus often appear to walk on their ankles or on the sides of their feet. However, with treatment, the vast majority of patients recover completely during early childhood and are able to walk and participate in athletics just as well as patients born without eqinovarus (Stetoskop Publisher, s.a.)).

It is a relatively common birth defect, occurring in about one in every 1,000 live births.), and the leftt according to the talovalgus type (talovalgus (eversion of the foot) is a complex congenital anomaly consisting of two components – the foot turned outwards and the talus position – foot turned towards the lower leg. Deformity treatment consists of physical procedures to which corrective fixators are added. In more difficult cases, and when physical therapy fails, the operational correction steps forward (Stetoskop Publisher, s.a.)). The right foot deformity was operated when the child was two years and eight months old. The left foot deformity was also treated surgically when the girl was three years and four months old. Rehabilitation ensued after each of the operations.

Hypertrophy on the right lower leg was noticed in the girl. The right foot is characterized by a lowered heel while the front part of the foot was corrected all the way to the neutral position. Limited dorsiflexion (dorsiflexion – bending the toes upward). The left foot is characterized by the lower medial foot arch. Apart from this, limited mobility in the left ankle is also present.

The skin and the mucous membrane is of normal colour.

The girl went through medical rehabilitation at the age of six due to slow psycho-motor development. The rehabilitation lasted for 15 days. During the rehabilitation, the following treatments were applied: paraffin, kinetherapy, work therapy and speech therapy treatments.

Prior to the rehabilitation treatments, it was noticed that the girl can reach a sitting position from the supine position and does not assume the four-legged position from the pronation. Apart from this, it was noticed that the girl could stand up with some assistance, at which the knees are flexed and that she could hold things with both hands and move them from one hand to another.

After the rehabilitation treatment, it was noticed that the girl could maintain the four-legged position. She can sit on her own and stand with assistance. Fine grasp and motor skills lack generally.

At the age of nine, the girl was again taken in for medical rehabilitation due to slow psycho-motor skill development and limited mobility in both ankles. The rehabilitation lasted 15 days as well. During the rehabilitation period, kinetherapy, work therapy and paraffin were applied as treatment.

No significant change was noticed before and after the rehabilitation treatment.

The girl was noticed to have a wide nasal base, otapostasis (lop-ears or otapostasis is a condition in which the ear lobe is too far from the side of the head. It is seldom present only on one side, rather it appears on both sides. It can be hardly noticeable and it is seldom highly noticeable. Otapostasis bears no functional obstructions, just aesthetical ones) and dyscranic skull (A dyscranic skull implies an altered shape of the skull – elongated or expanded). Microcephaly was also diagnosed (microcephaly presents a malformation characterized by a small head compared to the circumference and size of the head of the child of same age and gender. Microcephaly can occur at birth, but it can also occur during the first years of life. Microencephaly often follows microcephaly, which is an anomaly characterized by a small and poorly developed brain).

Mild hypertelorism was diagnosed after the pediatric physical examination (Hypertelorism presents a congenital malformation in which the orbits (bone structures in which the eyeballs are located) are far one from another, i.e. there is a large gap between the eyeballs (Miller et al., 2006)), periauricular areas on both sides, a bone bridge across the nasal ridge, position of hand fingers which corresponds to Camptodactyly (Camptodactyly is a medical condition that causes one or more fingers to be permanently bent. It involves fixed flexion deformity of the proximal interphalangeal joints. The fifth finger is always affected.), but the passive extension of the fingers is possible, shorter distal phalanges on hand thumbs, hypoplasia of the lower legs, probably as a consequence of the varus foot deformities and anterior position of the anus.

Microphthalmia was documented immediately upon birth (Microphthalmia also referred as microphthalmos, is a developmental disorder of the eye in which one or both eyes are abnormally small and have anatomic malformations (Medicine Net Publisher, s.a.)) due to which the girl had been hospitalised at the Institute for Eye Diseases where she was diagnosed with *Retinopatia prematura.* In addition, the atrophy of the optic nerve, Hydrocephalus and corpus callosum agenesis were also diagnosed.

The girl suffers from symptomatic epilepsy, and was treated several times at the Child neurology department for symptomatic pharmacoresistant epilepsy with epileptic status occurrences despite the ongoing use of antiepileptic drugs. Epileptic statuses are clonic seizures by nature and there are clonic jerks of all extremities and she is often unconscious after such situations.

Apart from all above mentioned, the girl was also diagnosed with a heart defect with a pulmonary artery stenosis (A pulmonary artery stenosis presents an obstruction at the right ventricular outflow tract and it is an innate heart malformation often seen. Pulmonary valve stenosis is the most often type of isolated obstruction of the right ventricular outflow tract), rectoperineal fistura (Perineum is the limited area between the anal sphincter and the scrotum. When a baby does not have an anus and the rectum ends in the perineum, this is called an ARM with recto-perineal fistula.), right kidney hypoplasia (Kidney hypoplasia is a rare condition in which the kidney is small, with a smaller number of nephrons, but hystologically normal. The prognosis are good if there is a hypertrophy of the second kidney). and vesicouretral reflux (VUR). In normal consitions, the urine flows in one direction: from the bladder to the urethra. About 1% of children worldwide have VUR. A borderline thrombocytopenia was noticed after examining the blood results.

The examination of the girl when she was nine years and seven months old, done in a genetics clinic using the karyotypes method determined that the girl is missing one chromosome, chromosome 11 to be exact.

Considering the results of the karyotype, and the physical examination, the overall results correspond to the 11q deletion syndrome, i.e. Jacobsen syndrome in the unusual form of the marker chromosome, as geneticists say. The karyotype of the parents is normal, indicating that the aberration is a *de novo* one, and that the risk for recurrence (the onset of the same problem in the subsequent pregnancies) is increased, but not much (probably a couple of percents only).

After all analysis and genetic examinations, the girl was setup with the following diagnosis:

- Deletiones chromosomaticae autosomaticae aliae Q93.8 (11q microdeletion syndrome – Jacobsen syndrome)
- Genetic counseling Z31.5
- Epilepsy G40
- Microcephalia Q02
- Defectus septi atriorum cordis Q21.1 (heart atrial defect)
- Stenosis arteriae pulmonalis Q25.6 (Pulmonary artery stenosis)
- Fistula recti K60.4 (Anal fistula)
- Talipes equinovarus Q66.0
- Hypoplasia renis unilateralis Q60.3 (unilateral atrophic kidney).

Special education and rehabilitation assessment

The girl started going to a special education school at the age of seven. She is taking home visit education and teaching. At the moment of evaluation, she was at the end of term of her third grade. The teaching is done by a special educator and rehabilitator, five times in two weeks, which amounts to an average of 50% of the total number of classes compared to the annual school number of classes.

Information the special educator and rehabilitator received on arrival were as follows: the girl did not attend the preparatory pre-school programme. She finished the first two grades at home, as well, and is schooled according to the individual education plan. The individual work with the girl was organized in home conditions, lectures, instructions, work space and material were all modified.

After examining her pedagogical profile, we received information on some of her abilities and habits. Regarding teaching, the educator wrote that she liked music and watch cartoons, as well as having two favourite cartoons which she watches. Regarding the social development, the girl looks forward to younger children, especially aged one to three years old; she is also disturbed by a crowd, especially if it involves many strangers at one place.

After examining her communication skills, it has come to the conclusion that the girl uses hand gestures, crying and looks to communicate with her parents and other family members when she has the need to get something (water, food, music...). Apart from this, she pronounces a couple of vocals and expresses joy with a smile.

In the field of independence and care on oneself, it was noted that the girl has no regulated sphincter control and wears diapers. She can hold on to a water bottle by herself and she does not chew food.

The pedagogical profile also states that all family members, including both parents, two older sisters and a grandmother take care of the girl and offer her assistance. During her first grade the girl had a physiotherapist and could stand up with minimal assistance in the mentioned period.

First contact with the girl indicated a feeling of distrust, direct and questioning look, but wouldn't allow for physical contact, retracted her hand, frowned. The girl can sit on her bed by herself, she did not need any back support, her back was bent, legs spread and bent in the knees, she kept her hands in front of her in her lap. The girl has excessive salivation, she was learned how to use a towel, but it is rather in her mouth, or she is biting it, instead of using it for conscious wiping. She is holding the towel with both hands, only by extending her palms.

The left foot is noticeably longer than the right one for 2cm as well as the left leg being longer than the right one for 2.5cm. All extremities in the flaccid/natural state are bent and she can straighten them with assistance, but legs are much easier to straighten than arms. Her mouth is constantly semi-opened mouth which is the reason why she has excessive salivation. She is curling her tongue in a spiral manner and the doctors presume this is due to heavy spasms due to epileptic seizures. She can hold on to her bottle all by herself, with palms widely extended and drink water, but she cannot put it down, rather just spreads her hands when she does not want to drink any more.

The girl reacts with a smile when she meets people she recognizes, she is joyful when seeing them, initiates a contact by bending her body forward and stretching her arms, but does not like her palms touched. She will not take an object when offered to her, except for the bottle when she is thirsty, and even then she will take the bottle on a stretched palm. She likes to hold objects that produce a rattling sound (plastic bags or crisp bags) which she would press onto her lap and then squeeze with her palms or crumple them.

If there are more people in the room talking to each other, she seeks attention, lets out cries to attract attention to herself, leans forward with her body towards the person she wishes to achieve interaction. Child curiosity is expressed, she wishes to see everything, but is cautious and takes a long time to touch a new object; most often she will not touch it, but only look at it. A conclusion can be reached that this is due to a prolonged period spent in hospitals on various analyses and examinations, which is why she would not let her hands be touched and is distrustful towards strangers.

When observing fine motor skills in the girl, we can come to the conclusion that it is far below the development level compared to her age. Having in mind that she has not yet developed opposable thumbs, the girl is unable to hold a pencil, which makes the assessment of drawing capabilities, or any other assessment which includes a pen and paper impossible. Besides, the girl is unable to string pearls, cannot assemble blocks and is unable to take anything using her thumb and index finger.

She can hold a small ball (eg. a ping pong ball) in her hand and she can throw it on command by the special educator and rehabilitator followed by gesticulation. After the treatment, she learned how to throw the ball with a swing, lifting her arm above the shoulder and throwing the ball using her shoulder joints. She cannot grab a ball, regardless of the size, neither using one hand, nor both hands. She can push the ball when on the ground, and stop it with her hands when it is rolling towards her.

The test results show that her right hand is the dominant one. It was unable to determine the the lower extremity lateralization.

The girl likes music, cartoons, and in this way she relaxes. Her muscles evidently relax when listening to a song she likes. She can change the song on her phone by herself. If she holds the phone in her hands, she cannot turn on the music. In case the music is not appealing she frowns, bends her back backwards and looks for a new source of fun with her eyes, which is usually a water bottle.

The evaluation and intensive treatment with the girl lasted a total of six months. During her first contact with the special educator and rehabilitator she has shown interest, but with great caution. She did not allow any physical contact on the first meeting, nor did she want to take something from the special educator and rehabilitator's hand. The special educator and rehabilitator observed her, but without initiating any kind of interaction. She would not do anything with her special educator and rehabilitator, assuming it was due to a presence of a stranger in the room.

On their next meeting, the little girl showed that she recognized the special educator and rehabilitator by smiling and allowed the special educator and rehabilitator to touch her hair and sit next to her. She turned her torso and head towards the special educator and rehabilitator expecting some interaction. She kept her hands in her lap and retreated them should the special educator and rehabilitator try to hold her hands or just extend the hand towards her.

The only physical contact which the girl allowed in the first couple of months was down to stroking her hair and placing the special educator and rehabilitator's hands on her knees, but without any sudden moves. Attempt of any other kind would result in frowning, sounds with which she expressed dissatisfaction and bending her back backwards.

After six months of intensive treatments, the girl would let the special educator and rehabilitator hold her hand and shake it, extend both of her hands to the special educator and rehabilitator and allowing the special educator and rehabilitator to take them. She is willing to perform simple exercises but only with music; if the music is not on, she would cramp her hands. She can lift her hands above her head with the assistance of the special educator and rehabilitator. She learned to clap her hands and express joy or answer to commendation using this gesture.

Regarding the lower extremities, she can straighten both of her knees and bend them in a sitting position, leaning her chin on them, also with the assistance of the special educator and rehabilitator. When lying down, she can imitate the bicycle riding moves with assistance. When the special educator and rehabilitator straightens her back, she can maintain the position for about 10 seconds.

She can get off the bed from the lying position on herself by turning from her back to her stomach and lowering herself down the side of the bed, but would sit on the floor immediately after. Due to having under developed calves and feet and gaining weight in the last year, the girl is unable to stand up by herself any more, not even by holding on to some surface. Standing up is possible only with assistance by the special educator and rehabilitator or someone else, and only for a couple of seconds.

The girl had orthopaedic shoes ordered for her, orthosis for the knees and a walker, but she has not yet started using them.

As far as speech is concerned, the girl could only pronounce vocals “A”, “E, and “I” at the first encounter. There is no movement imitation, she does not understand that she is to repeat what she sees, although she has eye contact and follows everything the special educator and rehabilitator does. After intense treatments, the girl can repeat the words “dad”, “aunt” “grandpa” and “child” after the special educator and rehabilitator, but has no awareness on the meaning of the words. She has clear pronunciation of the sounds “t” and “d”. By extending the duration of the sound “i” she expresses surprise and excitement. The girl has not yet mastered the lip sounds “p”, “b” and “m” because of the fact that her mouth is always semi-opened, and she has never even accidentally produced them. She would not even allow the special educator and rehabilitator to join her lips with their fingers, she frowns, moves backwards and starts to cry. She does not place her lips in the position for pronouncing sounds “o” and “u”. She learned to say “come on” and this is the phrase she uses to initiate communication, expects something or wishes for the activity to continue.

One cannot determine exactly how developed her receptive speech is. What we were able to conclude is that she understands the words “mum”, “dad”, “granny” and “sis” and diverts her look towards them when they are mentioned. Apart from this, she also reacts to the name of the special educator and rehabilitator and turns in the appropriate direction when asked: “Where is ___?” She can understand the words “give”, “come on”, “take”, “yes”, “no” and “let’s go”.

The fact that the girl’s receptive speech is more developed than her expressive, but also due to her intellectual condition and distrust she has towards people, one cannot determine with certainty the degree of understanding speech.

The sense of hunger is expressed by imitating the champing sound and turning to the source of food. she cannot chew, she eats puree or soft food exclusively. She can bite with her front teeth. She is fed using the spoon, but is unable to hold it. She drinks water or juice from her bottle mainly, she can hold the bottle on her own, using both hands with palms widely stretched. When she stops drinking she just spreads her hands and lets the bottle drop down. She can drink out of a glass, but only with assistance. About half an hour after eating her salivation is excessive as well as during high levels of excitement.

After the intense trainings, she learned to hold the bottle with one hand. She still does not have opposable thumbs, instead, the thumb is flexed. On command, she would give her bottle to the special educator and rehabilitator but when offering it, she would only open her hand and let go of the bottle, regardless of the fact whether the special educator and rehabilitator stretched their hand to accept the bottle or not. She would repeat the same action with other objects. She can take the bottle from the table by herself, with low level of precision, the movement towards the object is not direct, but she eventually grabs the object. If she does not wish to take the object, she would retreat the hands and bend the fingers to make a fist.

The girl loves music. She enjoys nursery rhymes and this, in combination with certain cartoons, is her only source of interest. Most of the activities she performs are done only if the music is turned on. Before the treatment, it was not sufficient just to have the music on; she also needed to establish visual support with the phone, tablet or computer. She showed strong signs of objection if the image was blocked or would disappear. Fixations towards the phone or tablet were so strong, that even when the phone was off on the table and she would see it, all activities would seize and she would keep staring at the phone and ask for the phone to be turned on. At first, not obeying her wishes and putting the phone out of reach resulted in crying or pushing the parents or the special educator and rehabilitator, until her wish was met.

After intense treatments, the girl can now listen to music without visual support. If there are no special activities at that moment, she would search for the sound source and wish to look at the video as well. She would react by smiling and clapping to nursery rhymes she recognizes. She feels joy if the special educator and rehabilitator sings songs while doing exercises. She has her favourite songs to which she reacts by producing an extended "i" sound and laughter. She learned to dance to the song "Head, shoulders, stomach, knees", by sitting on the floor and showing body parts, but with the assistance of the special educator and rehabilitator. She also learned to follow the special educator and rehabilitator and move when hearing the nursery rhymes "When you're happy and you know it..." and "One pretty finger...".

As far as other nursery rhymes are concerned, she learned to follow the rhythm by swaying her body left and right and clapping. Her muscles are evidently relaxing with music and it is much easier to work with her then. The most difficult part is trying to relax her elbow joints; they are almost always in a bent position.

The girl can recognize basic emotions, intonation and facial expressions. If someone is mad with her or raises their tone, she starts to frown and makes a movement with her hand to cuddle that person. She uses a smile to react to a smile, she likes to cuddle and hug. She is unable to hug a person consciously and gently, but hugs other people only when she is held in arms, and even then, it is mostly just to have a firm support. When someone is crying, she would begin to remove that person's hands from their face and she would change her mood. She does not like loud sounds, or when someone is yelling.

The girl recognizes short stories being told to her, with visual support of images, but shows little interest for them. She would follow a moving image with her eyes and after the treatment would divert her looks towards the image of a dog when showed two photos: one of a dog and the other of a cat.

The girl has a developed object permanence, she seeks the hidden object with her eyes, she moves from the point where she has last seen the object. If the object isplaced inside a box, she will eventually look inside the box, although she has no awareness that the object had been put there previously.

Any evaluation or treatment with the girl is taking place on a mat on the floor or “in the air”. The girl refuses to work at the desk or take objects from the desk. She puts up great resist if puzzles or any other frames for evaluating fine motor skills or visuomotor skills are places in front of her.

Due to the health condition of the girl who spent a prolonged period in hospital for epileptic seizures during the time of treatments, it was impossible to give any detail evaluation. The girl has many fears which are probably a result of numerous examinations in hospital, some of which were very invasive. Furthermore, there is always the possibility that the girl is hypersensitive to touch, especially in the areas of her hands and forearms.

CONCLUDING REMARKS

On examining the literature and other case studies concerning tihs syndrome, we have come to the conclusion that beforehand and exact diagnosis is vital for Jacobsen syndrome (Grossfeld et al., 2004). Early diagnosis and early treatment are of high importance for children with any type of impairment. Children involved in early treatment have better chances and developed skills. It is a commonly known fact that children at early stages of their lives are quicker to adopt cognitive and motor content.

The lack of early diagnosis in this girl, meaning early treatment as well, led to the fact that her capabilities have not reached full potential in any of the given areas.

It is our opinion that if the girl had had appropriate early treatment, she would have been able to chew solid foods, and maybe even feed independently.

Expressive speech would have been more developed, as she has managed to learn four words in this six-month period. As far as repetitive speech is concerned, we cannot determine accurately the number of words the girl understands, but we assume that this is also an area in which she would have advanced, should early treatment had been initiated beforehand.

As we have seen, the girl cannot walk, and does not rely sufficiently on her feet lately. Having in mind the condition in which she had been on our first arrival, the result of regression and under developed muscles led to the lack of any type of lower extremity activities. In the last two years the girl also did not have any treatments with a physiotherapist. Examining her and her medical history, we have come to the conclusion that the girl would definitely have been able to walk should she had started using orthosis, a walker and orthopaedic shoes in due time. Having in mind that the girl will continue the same treatments, there is a possiblity that she will be able to walk, but estimates say that this process will take up much more time than if she had been involved in early treatment in time.

The girl’s cognitive skills were unable to be examined to the fullest due to her condition. Considering multiple anomalies she has, it is highly difficult to determine her true potentials. At early years, the girl has had frequent epileptic seizures due to being resistant to medications, which resulted in regression in certain areas, mostly cognitive ones, presumably.

As we mentioned before, the girl has many fears, is very distrustful and this is probably due to the fact that she has often been hospitalized and due to different examinations, some of which being highly invasive. There is reasonable doubt that the girl is hypersensitive to touch, especially in the areas of her hands and forearms. This doubt is backed up by the fact that she does not like her palms being touched, does not like to take objects into her hands, especially unknown objects. Besides, the girl resists being dressed, combed and tying her hair. All these factors make the evaluation and treatment harder.

It is recommended that she undergoes intense special education and rehabilitation treatment, speech therapy treatment as well as treatments conducted by physiatrists. Special attention needs to be given to conquering fears, developing lower extremities and speech as well as cognitive development.

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THE IMPORTANCE OF EARLY ESTIMATE OF SPEECH-LANGUAGE CAPACITIES IN PREVENTION OF DEVELOPMENTAL DYSGRAPHIA

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SUMMARY

Written speech is the last to develop and it represents a form of speech expression. It consists of two speech fields. These are coding and performing of a written speech act and decoding of written signs. The first field belongs to performance of willing acts and it belongs to experiential activities while decoding belongs to Gnostic functions. In the process of writing a phoneme is connected with a certain letter image. It is considered that the most common cause of substitution is the impossibility of adequate auditive voice discrimination. Subtle voice differentiation is more necessary for proper writing than for oral speech, which means that there is no writing without proper speech and language development.

Dysgraphia is a disability in learning to write or in the process of acquiring the ability to write although there are preserved intelligence, good sight and hearing, proper education and social conditions. Early detection of faults in development of motor and speech patterns and timely involvement of children in appropriate treatments would give a significant results and contribute to a significant reduction in number of children having a dysgraphia.

Our research was conducted on the population of young schoolchildren and included the sample of 482 children. The aim of the research was to study speech-language capacities and graphomotor abilities in order to detect writing difficulties among young schoolchildren in Belgrade schools. Based on the results obtained from the research and their statistic analysis, we can conclude that the existing capacities of speech and language pathology offer possibilities to detect difficulties in writing at young schoolchildren.

Key words: early detection, speech-language capacities, graphomotor abilities, developmental dysgraphia

INTRODUCTION

Human needs for continuous acquisition of knowledge, which lasts in time, led to expansion of the means system of verbal communication. The writing transmits the voice message and develops on the basis of speech. Deprived of the physical elements and transferred from acoustic to visual analyzer has received a durability that speech usually does not have (Bojanin, 1985; Adams, 1994; Sayeski, 2011; Snowling, 2013). The entire culture of the man’s past became available to modern civilization thanks to letter. Inspite of shaping characters and words written speech indicates several significant structures and functions involved in realizing the act of writing. It is defined through the concept of space (the direction of the string), the rhythm of grafema placement in space, the game of tension and relaxation of muscles involved in this act and which is backed by the quality of personal emotions in a given time of writing (Destreri et al., 2000; Ouellette, Tims, 2014). Language system of man consists of three forms: speaking, reading and writing. Each of these form has a reciprocal relationship with others. That relationship is hierarchical and is reflected in the consistency of development. Researches in frequency of using forms of the language system, in the course of the day in high developed areas are shown in Table 1.

Table 1 *The frequency of using language forms*

Hearing	36%	
Language	28%	64%
Reading	20%	
Writing	16%	36%

The process of writing of adult man is automated and is different from the writing of a child which is just overcoming this skill. The act of writing involves very complex processes and elements of: motor, manipulative, kinesthetic, visual and auditory activities, the ability of reasoning and the ability to use linguistic and non-linguistic knowledge (Brunsdon et al., 2005; Fletcher-Flinn, 2014). Since the writing is highly complex and phylogenetic late developed functions, it is difficult to talk about a specific center in the brain that is responsible for the realization of writing. However, as writing disorders are usually occured at lesions gyrus angularis, Eksner center (the bottom of the second frontal curve) and pars opercularis dominant hemisphere, these centers are considered as basic neuroanatomical system for writing function (Rinne et al., 2000; Bookheimer, 2002; Johnson, 2003). For developing the function of writing that engages the whole being (psychological, physiological, biological and motor functions), the most important is neuropsychological motor organization, that is the organization of the central nervous system. Disturbance and lack of neurologic maturity often do not allow necessary coordination for the speech, and that is manifested in the child's movements (Rapp, 2005; Pennington, 2009). Which means there is a need to create a deliberate, controlled movements, which will carry out a precise willing action. These activities at the very beginning are very simple, and later more complex (Smits-Engelsman et al., 1997, Govedarica, 2000).

Relation between handiness and speech skills has long been known. Neurological diagnosis are based precisely on evaluating the ability of hand movement, and the movement of hand and fingers. Sophisticated and coordinated hand movements effect on the sensory-motor development of CNS, and through this also on the development of written speech, which requires the highest degree of sensorimotor coordination (Rosenblum et al., 2010; Nicolson, Fawcett, 2011). Success of forming and unfolding of the manuscript implies harmonious psychomotor organization in whole. The process of writing depends on: the muscle tone, strength in carrying out the action, the possibilities of localization movements, and the speed of execution of the act itself. Between 5 and 6 years child spontaneously demands to draw better, that drawings are more like object in reality. In that way gradually occurs the representative level of graphomotor act. In the period of 5-7 years the child learns to write, resting the whole body on the table when writing. Later, when writing, it holds a little away from the table and the body is kept upright and firmly. In this way, the body becomes a support to the upper limb which performs the action of writing (hand), i.e. muscle tone body matures. The intensity of pressuring the surface, i.e. the intensity of the power in action of writing changes over the action, which reflects on the line of the manuscript. In the year 7 when a child learns to write, muscles are strained and strength is directed and stiffens the muscles that perform the action of writing. In 11-12 year, the movements are soft, elastic, and each group of muscles has its own tension level. In early childhood is difficult to perform precise movements due to dis-gestures of other parts of the body, which follow them. Later it achieves full accuracy of the action which is carried out by that movement. Writing speed is determined by the maturing of graphomotor team. This development takes place untill about 14 years when the certain automatism necessary for full communicative writing is achieved. Priority and intention is to look at writing as a function of communication, which means that we have to analyze it in its full oneness with gnostic ability, within the gnostic-practice (understanding of written) and / or practice-gnostic (write) organization (Raymer et al., 2003, McCloskey, 2006; Graham et al., 2006).

The aim of this study is to examine spoken-linguistic graphomotor capacities and capabilities, in the context of detection and prediction of difficulties in writing of young school age children at Belgrade schools.

The hypothesis of the research is: The predictive capacity of spoken-linguistic pathology make possible the revealing of the difficulties in writing in children at young school age.

METHOD

The research was transversal and was conducted in two elementary schools in the municipality of Voždovac, namely: Elementary school “Milan Đ. Milićević “and Primary School ”Bora Stanković“. Basic sample consisted of 482 children of the third and fourth grades of which 278 children in third grade and 204 children in the fourth grade. Among examined children were 262 boys and 241 girls. Subsample is selected from a basic sample population, while respecting the criteria of presence of dysgraphia, which is determined by applying the scale for the assessment of handwriting dysgraphia (Aziriagrera, Ozias). This sub-sample consisted of 30 disgraphical children. In our research, we looked at this as a sub-sample of the experimental group. Other sub-sample of children selected from the basic sample consisted of 30 children of harmonious handwriting. Equable by age (class) with the experimental group. This group we watched as the control group. For the experimental and control groups, an additional test criteria was defined by the absence of other disturbances and disorders in intelligence, motor skills and sensory perception.

Instruments

For this research, we applied the following instruments: Test for estimation of handwriting dysgraphia – a modified version of the scale for assessing dysgraphia authors Ozijas and Ažiriagera (Ćordić, Bojanin, 1997). The first set of characteristics used to assess the spatial organization. Another group to assess the performance of a series of letters, a third group of characteristics reveals errors in form and proportion of letters. Dysgraphia Assessment was carried out on the basis of analysis of ability to write from dictation, transcription and writing of free composition. A predictive test for dysgraphia (LJ. Budimirović and S. Vladisavljević), which examines graphomotor dexterity and visual perception. Follow the task of understanding, skill of execution and ability to focus attention. Test phonemes (letters) analysis and synthesis (V. Radičević), this test first examines the ability of phonemic hearing, memory phonemes and their synthesis of the group. In assessing the synthesis of words, the examiner pronounced the votes, a respondent is advised to listen to the voices of the examiner pronounced and finally says what he said (the examiner between each spoken voice pauses). Testing analysis consists of issues from how many letters consist of individual words, the letter of a word eg. on the second or third position and Fig. During testing, monitors possible participation in the articulation of words to sonic analysis. Similar to the above is the examination of the situation of the letters in the word. Testing sound synthesis consists in giving the entire style or words, letter by letter (voice after voice) where the subjects are required to say that it is a word or syllable. Good analysis and synthesis of words is the basis for the proper writing and reading, and therefore is the basis of good literacy and eliminating errors based on the structure of words. In order to examine the justification of the objectives and tasks of the collected empirical data we have processed using the statistical analysis by parametric algorithms SPSS v.17 for Windows. Data are presented in absolute and relative terms, tables and pictures.

RESULTS

Table 2 *Structure of respondents in relation to age (class)*

Class (age)	N	(%)
3	278	57.7
4	204	42.3
Total	482	100.0

Table 2. shows the distribution of respondents presented in relation to age. From the table it can be seen that the largest number of respondents were in the third grade of elementary school, 278 (57.7%), while in the fourth grade were 204 (42.3%).

Table 3 *Structure of respondents with respect to gender*

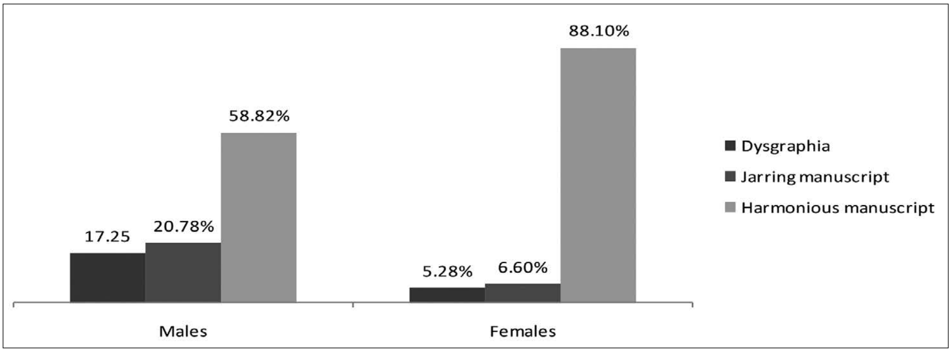
Class (age)	N	(%)
Males	255	52,9
Females	227	47,1
Total	482	100

Table 3. Shows the distribution of respondents presented in relation to gender. From the table it can be seen that the majority were male subjects them 255 (52.9%), while females were 227 (47.1%).

Table 4 *Ability to write in younger school age children*

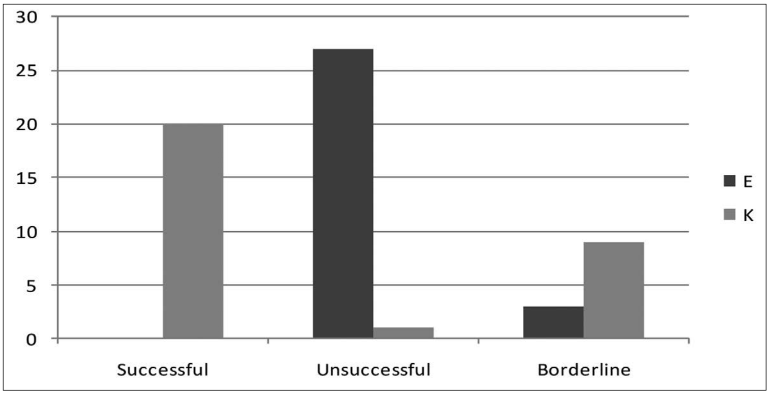
Handwriting	N	(%)
Dysgraphia	56	11,6
Jarring manuscript	68	14,1
Harmonious manuscript	358	74,3
Total	482	100

The results in the table 4 shows that dysgraphia occurs in 56 examinees (11.6%) in younger school children, while the jarring handwriting had 68 respondents (14.1%), a harmonious 358 respondents (74, 3%).



Picture 1 Distribution of respondents by writing abilities in relation to gender

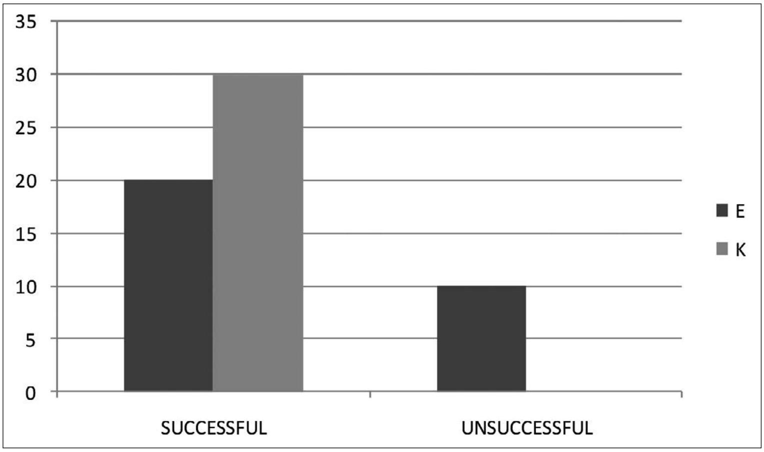
Picture 1. shows that in the sample were 44 male subjects with dysgraphia and 12 female subjects, with the jarring handwriting was them 53 males and 15 females, while with the harmonious handwriting was 158 male and 200 female subjects.



Picture 2 The distribution of examinees E and K group in relation to the results of a predictive test

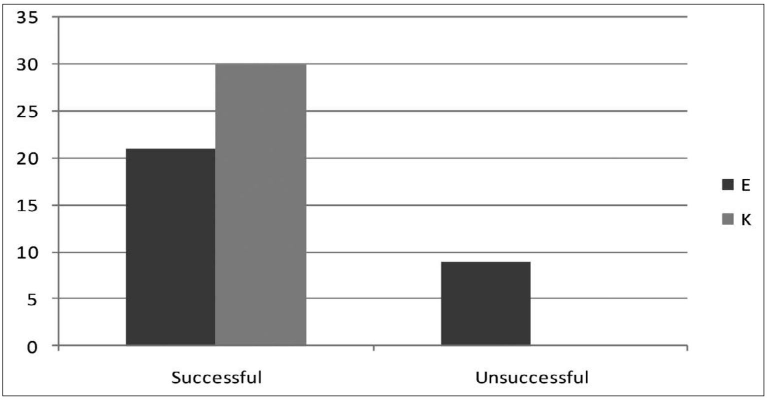
Picture 2. presents the results of E and K groups of examinees, the predictive test for dysgraphia. Respondents of E Group achieved significantly lower scores than subjects

K groups (p=0.000). In Group E of respondents in the category of unsuccessful there were 27 patients in the category of borderline 3, while there was no successful ones. In the K group in the category of unsuccessful was 1 respondent, border was 9, and 20 successful examinees.



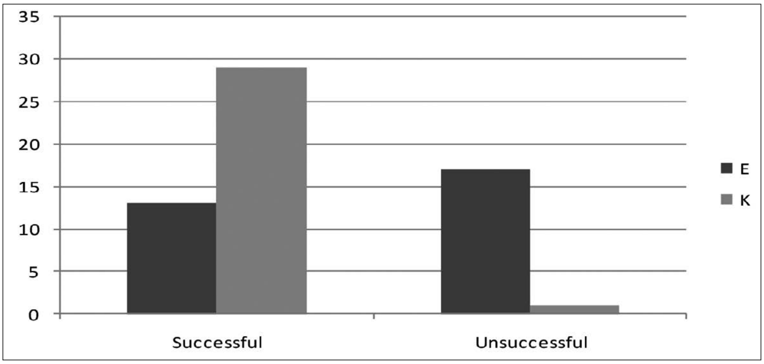
Picture 3 Distribution of respondents E and K groups in relation to the results of the task The letter in front of... (analysis of the letters in the sentence, test)

Picture 3. Shows that in E group was unsuccessful 10 respondents, while 20 of them were successful. Situation at K Group is as follows: no unsuccessful, and 30 have been successful. Statistical analysis found a statistically significant difference (p=0.000) between E and K group.



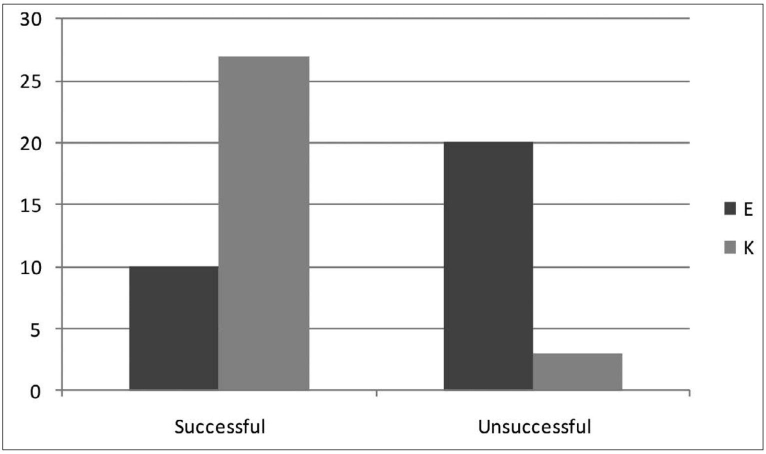
Picture 4 Distribution of respondents E and K groups in relation to the results of the task The letter behind... (analysis of the letters in the sentence, test)

Picture 4. Shows that in E group was unsuccessful 9 respondents, while 21 were successful. Situation at K Group is as follows: no failures, and 30 have been successful. Statistical analysis found a statistically significant difference (p=0.001) between E and K group.



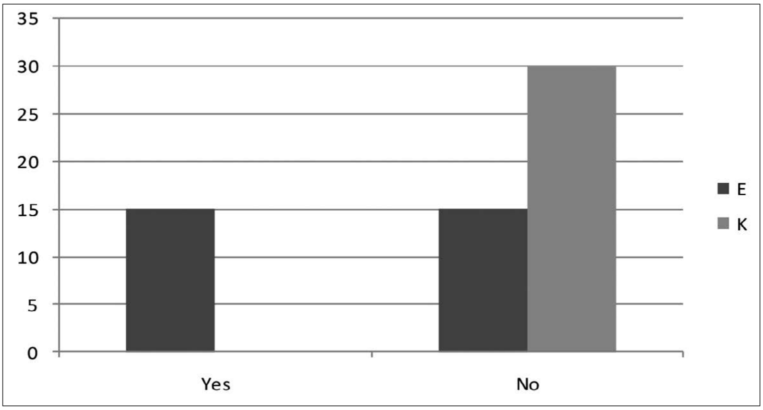
Picture 5 Distribution of respondents E and K groups in relation to the results of the task "RASKRSNICA" (synthesis of the letters in the sentence, test)

Picture. 5 shows that in E group was unsuccessful 17 respondents, while 13 of them were successful. Situation at K Group is as follows: 1 unsuccessful and 29 successful. Statistical analysis found a statistically significant difference (p=0.000) between E and K group.



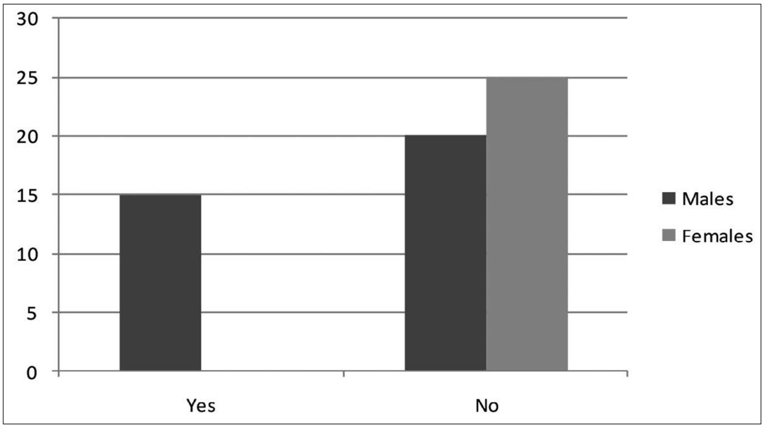
Picture 6 Distribution of respondents E and K groups in relation to the results of the task "PROSTRANSTVO" (synthesis of the letters in the sentence, test)

Picture 6. shows that in E group was unsuccessful 20 respondents, while 10 of them were successful. Situation at K Group is as follows: 3 unsuccessful, 27 successful. Statistical analysis found a statistically significant difference (p=0.000) between E and K group.



Picture 7 The distribution of subjects K and E group in relation to the presence of the dysgraphia with the linguistic pathology

In Picture 7. it is represented by E and K groups in accordance with the presence of the linguistic dysgraphia. From picture 8 we can see that the respondents Group E were significantly worse by the presence of dysgraphia with linguistic pathology of respondents in K groups (p=0.000). In Group E of respondents in the category no respondents was 15, and in the category were 15. In K group in the category no there were 30, while in the category yes, were not any.



Picture 8 Distribution of respondents by gender in relation to the presence of dysgraphia with linguistic pathology

Picture 8. shows the distribution of respondents by gender in relation to the presence of dysgraphia with linguistic pathology. From Table 30 shows that male gender, 20 of them have no dysgraphia with linguistic pathology, and 15 of them have. As for females, 25 of them have no dysgraphia with linguistic pathology, while there is no respondents who have it. Statistical analysis found a statistically significant difference (p=0.000) between gender and the presence of dysgraphia with linguistic pathology.

DISCUSSION

We wanted to determine what options we have for predicting outbursts in graphomotor expression on the basis of the present linguistic speech pathology in respondents. In this research in the basic sample, we got results on the frequency of occurrence of dysgraphia. The results shown in the table (3) and the picture (1) to dysgraphia occurs in 11.6% in cases of younger school age children, while the jarring handwriting had 14.1% of the children, and harmonious handwriting 74.3%. Analysis of writing skills in relation to gender showed that dysgraphia and jarring handwriting exhibit significantly higher in males than in females (p=0.000). In group of dysgraphia handwriting were (44) males and (12) females, and in the group of jarring handwriting (53) males and (15) females. We established incidence of dysgraphia at younger school age in line with our expectations and confirms the results of earlier studies (Golubovic, 2003, Stević-Otasević, 2010). As we, except the basic, also had a sub-sample, which consisted of children with dysgraphia determined by the presence of 30 of them, compared to the achievements of children with harmonious handwriting. All respondents to the achievement tests are analyzed collectively for both groups. Results of respondents with dysgraphia in relation to the results of respondents with a harmonious handwriting on the test analysis of the letters in the sentence, analysis and synthesis are given in picture (3, 4, 5, 6). With this test, we examined the ability of acoustic analysis and synthesis of respondents, from simple to the more complex task. Test gives us insight into the predisposition to adopt a function of reading and writing. We started from the assumption that the respondents with harmonious handwriting were better on the test analysis and synthesis then respondents with dysgraphia. From the tables above we can see that the individual tasks, analysis and synthesis of respondents with dysgraphia were significantly worse than respondents with harmonious handwriting. The results of the analysis of the letters in the sentence test, on a subtest "The letter in front of" are given in the picture number (3). Unsuccessful respondents with dysgraphia reflected in the growing number of respondents in the category of unsuccessful (10), while in groups of harmonious handwriting there were no unsuccessful. In the category successful in subjects with dysgraphia was (20), while respondents with harmonious handwriting, all of them were successful (30). Results of subjects with dysgraphia on the part of the analysis of the letters in the sentence test on a subtest "The letter behind…" significantly were worse than those with harmonious handwriting (p=0.001). This indicates a poorer ability of subjects with dysgraphia in analysis of the situation in a letter "behind" than respondents with harmonious handwriting. The results of the test subjects letter analysis in the sentences on a subtest, "a letter behind" are given in the picture number (4). Failure respondents with dysgraphia reflected in the growing number of respondents in the category of unsuccessful (9), while there were not respondents with harmonious handwriting. In the category successfully in respondents with dysgraphia was (21), while respondents with harmonious handwriting that is successful, all of them (30). Results of subjects with dysgraphia on the part of the test letter analysis on a subtest, "a letter behind" were significantly inferior compared to those respondents with harmonious handwriting (p=0.001). This indicates a poorer ability of respondents with dysgraphia in analysis of the subtest a letter "behind" compared to respondents with harmonious handwriting.

On assignment (intersection), picture 5, 6 on the part of the test results of a word synthesis respondents with dysgraphia were significantly worse than patients with harmonious handwriting (p=0.000). Unsuccessful of respondents with dysgraphia is reflected in the growing number of children in the group unsuccessfully (17) in this task as compared to respondents with a harmonious handwriting (1). In the group of respondents successfully with dysgraphia was (13), with a harmonious handwriting (29). The test results of respondents with dysgraphia and respondents with harmonious handwriting on the part of the test letter synthesis task (raskrsnica) are given in picture (5). Review of result of respondents per group to test synthesis of the subtest "prostranstvo" are given in a picture 6. Unsuccessful of respondents with dysgraphia reflected in the growing number of respondents in the group unsuccessful them (20) while (3) in respondents with harmonious handwriting. The group successfully in respondents with dysgraphia was (10) subjects and in respondents with harmonious handwriting them (27). Results of respondents with dysgraphia are significantly worse than the same harmonious handwriting, on a subtest letter synthesis task (prostranstvo) (p=0.000). Similar results in the research were obtained by other researchers (Hoeft et al., 2006; Booth et al., 2004; Miceli et al., 2006; Kohnen et al., 2008). Their results suggest that children who have outbursts in the function of writing have phonological deficits and problems with spelling, as well as problems with the analysis and synthesis of less frequent and polysyllabic words. Results of children with dysgraphia presence compared to the results of children with harmonious handwriting on a predictive test are given in pictures (1). With this test, we examined graphomotor dexterity and visual perception. We believe that the test is of great importance because it is the prediction of character and provides the possibility of failure in graphomotor expression, if timely applied. The survey started from the assumption that the graphomotor capability and better visual perception in children with harmonious handwriting in relation to children with dysgraphia. From the above picture we can see that the predictive test subjects with harmonious handwriting were statistically significantly better compared to those with dysgraphia (p=0.000). Success of respondents with harmonious handwriting reflected in the growing number of subjects in the group of successful (20) in this test compared to subjects with dysgraphia, where there was not successful ones. In the group of bordering respondents with dysgraphia was (9) subjects, and in respondents with harmonious handwriting (3). While the group unsuccessful in respondents with harmonious handwriting was (1) respondent, while respondents with dysgraphia were (27). Results of the respondents with harmonious handwriting on a predictive test indicates that these respondents have better graphomotor ability and visual perception. Results of respondents with dysgraphia in relation to the results of subjects with a harmonious handwriting, and in relation to the presence of dysgraphia with linguistic pathology are given in the picture number (7, 8). From that picture it can be seen that the subjects with dysgraphia compared to subjects with harmonious handwriting was significantly worse (p=0.000).

CONCLUSION

Based on the results of tests writing skills in children of younger school age we can conclude the following:

1. Dysgraphia occurs in 11.6% of cases. Characteristics of jarring handwriting had 14.1% of the children, while the harmonious handwriting had 74.3% of children.
2. Dysgraphia and jarring handwriting statistically significantly are more often manifested in males compared with females. (78.6% in males and 21.4% females)
3. Graphomotor dexterity and visual perception is worse in children with dysgraphia compared to children with harmonious handwriting.
4. The voice analysis of words is better in respondents with harmonious handwriting compared to respondents with dysgraphia.
5. Voice synthesis of words is worse in respondents with dysgraphia in relation to those with harmonious handwriting.

Upon observation of the results was carried out general conclusion: The existing capacities of speech – language pathology provide opportunities for discovering difficulties in writing in children of younger school age.

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THE METHOD OF SELF-KNOWLEDGE POLYFORM HEURISTICS IN THE TEACHING OF MATHEMATICS

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SUMMARY

The aim of the research is to experimentally determine to what extent the application of contemporary methods of teaching Mathematics by the methods of self-knowledge polyform heuristics with the help of computers (using an example of introducing the teaching topic of "Linear functions" in 8th grade of primary school and the Desmos Graphing Calculator, the online software) affects the increase of educational effects of the teaching processes, contributes to the durability of knowledge and affects the increase of the students' motivation within the process of teaching. According to this definition, the students' achievements will be measured in accordance to the durability of knowledge as well as through learning motivation. Also, this paper experimentally confirms the effectiveness of the teaching of Mathematics as seen in the light of the didactic polymorph principle i.e. the didactic principle of diversity with the geometric interpretations added to it.

Key words: Traditionalist teaching, receptive learning, polymorph principle, method of self-knowledge polyform heuristics, productive Mathematical thinking

INTRODUCTION

We live in a time of rapid and intensive development of science and information technology. This intensive development is reflected and intensified in the form of changes and segments of human life. We are the witnesses of the times in which knowledge is being multiplied at an incredible speed so that it is no longer possible to study a profession in the early period of our existence in which we become educated and then which we consider to be a terminated chapter of our lives. Due to the volume of knowledge, it is more important today that a person knows how to choose from the abundance of information what is important, use it and store it than to remember or just store an abundance of facts in the head. In this context, we recognise a number of cognitive, affective, social and practical competences that have not previously been so important as today. Our teaching practice is still dominated by passive methods that do not encourage students to actively participate in the teaching process. Criticism of the contemporary teaching system is justified and is usually related to the overloading of teaching content which is adopted with difficulties by the students within a certain period of time, focusing on an average student, disregarding individual abilities and methods and non-applying the procedures for the development of intellectual abilities.

In an attempt to solve the problem of teaching drawbacks, numerous studies were introduced which further confirmed that the practice was based on the traditionalist

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teaching process and that the dominant method of learning was receptive learning. According to (Ivić, I. et al., 1997), in order for receptive learning to also be meaningful, it is necessary to first establish students' knowledge, to use all means for motivation and the best presentation skills, to bear in mind that education takes a form of constant interaction between teachers and students, to use didactic means and to use the process of assessment which will lead towards understanding.

Traditional teaching lacks in changes, diversification, individualisation, and dynamism, and is reluctant to accept the facts that come out from the modern social-economic and scientific-technological development. It still represents an obstacle to the advancement of modern didactic and methodoligical ideas. Contemporary teaching of Mathematics should induce and incorporate the mentioned elements and the modern classroom should be transformed from the classical lecture hall to a workshop of active, dynamic working process.

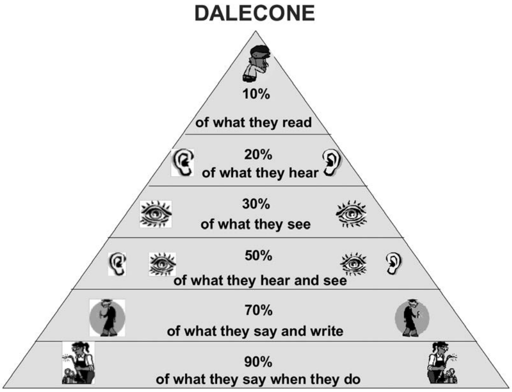

Figure 1.

Five centuries BC, the great Chinese sage, Confucius, said that the best teaching method was the one which required the pupils' perception of the object by engaging all of their senses. The views that he accepted as axioms have been experimentally confirmed by contemporary psychology. The ways of how students acquire teaching contents are best illustrated by the Dale cone (see Figure 1), [2], [7].

A teaching process should be based on the evident psychological fact that the changes and diversity in work are refreshing while monotony mainly induces lowering of the interest and leads to passivity and boredom. If looked through the prism of "activity and dynamism", teaching relies greatly on a methodically important principle, the polyform principle – a "motivating light" in teaching.

Receptive learning has its advantages in terms of time saving because it facilitates the process of knowledge assimilation. Students first evaluate the importance of the given content, reorganise the information and fit them into their experience base, vocabulary, structure, ideas. The downsides of the traditionalist teaching process are: a pre-defined plan and programme (to be adopted by the students) and the essentials to be remembered are emphasised as well as what should be paid attention to. Assessment is completed both in writing and orally, and the students' motivation is weaker and external. During the teaching process, the teacher serves the student the sequences or packages of syllabi in the form of lessons. From the students' standpoint, knowledge is far more than just superficial and asking questions about the material and individual cognition is even less present.

The method of self-knowledge polyform heuristics. Five centuries BC, the Chinese sage, Confucius, said that the best option was the teaching method that required students to perceive the studied content by engaging all their senses. The precepts which he accepted as axioms were experimentally confirmed by contemporary psychology.

Such teaching is based on the evident psychological fact that changes and diversity in work are constantly refreshing it, whereas monotony mainly induces the weakening of interest and the appearance of passivity and boredom. Seen through the prism of "activity and dynamism", it finds its support in a much important methodological principle, the polymorph principle, which is an indispensable "motivational light" in the daily work with students. The polymorph of the apparent perceptions, along with the adequate implementation of efficient combined effect of multiple methods, accelerates the processes of adoption and formation of concepts by the students with regards to the way of acquiring the perceptions by the isolated verbal-textual method. That is why the combinations of the verbal-textual, illustrative-demonstrative and laboratory-experimental methods should be applied in the modern teaching of Mathematics by presenting them in the form of a polymorph unity of their methodical forms of the method of self-knowledge polyform heuristics.

The didactic polymorph principle is not at all considered as a didactic specificity, and if it is occasionally applied, it is used quite rarely, intuitively, spontaneously, singularly and accidentally in the teaching of Mathematics in primary and secondary schools and at universities.

The essence of the application of this principle consists of the permanent insistence on the integral perception of different approaches of understanding and the studied teaching phenomena and that is why its exploitation in practice requires teachers to have excellent knowledge and skills to apply their diverse professional and didactic-methodological options yet induces the students' constant cognitive activity expressed through quality individual hard work and greater motivation.

The efficiency of the polymorph principle is based on the evident psychological fact that the changes and diversity in work are constantly refreshing the process of teaching, whereas monotony is mainly inducing the weakening of interest and the appearance of passivity and boredom. The polymorph principle, due to the stated characteristics, represents the universal scientific and educational principle, which gnoseological base is identical to the principle of permanence and the law of negation, due to which the polymorph principle is gaining the traits of the dialectical law. Since the polymorph principle includes all existing didactic principles, this puts this principle on a pedestal of universality (Marković, 2008).

Socrates' heuristic method (learning through discovery), resurrected through the works of the famous mathematician and methodologist of Mathematics, George Polya, was, in a sense, Polya's pursuit and a positive attempt to search for universality in the mid-twentieth century.

We acquire the basis of our overall knowledge of the world in which we live through the senses. According the generally recognized Aristotle's classification, those are the sense of sight, hearing, touch, smell and taste. Psychologists have

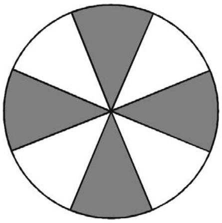

Figure 2.

found out that more than two-thirds of our knowledge is acquired through the senses of sight yet less than one-third through the use of other senses. That is why eyesight is considered the most valuable. The eye sees the objects that emit and reflect light. It sees a large number of details concurrently, but our focus is only on some of them and that is where the similarity between the eye function and the digital or film camera stops.

Perception is not just a vision, but in separably from it, there is a selection of some details and their understanding. Thus, "noticing-perception" is the process through which we interpret sensory impressions and so we give them meaning. We, therefore, have frequent occurrences of the so-called backgrounds, where one object stands out and everything else is in the background. In Figure 2, we segregated only one of the two Maltese Crosses, either the shaded or the unshaded one.

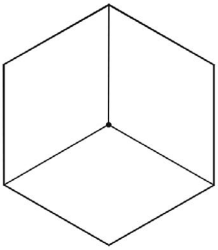

Figure 3

The tendency to present the "bad" forms as "good" is a basic principle of perception. Interpretation depends on how certain objects are associated with our internal representations. Therefore, the example in the Figure 3 can be perceived in a polymorphic manner as a hexagon, a cube or a trihedron. All of this depends on the interpretation. If we consider that the object is a board picture, it is a hexagon; but, if we imagine the central point in front of that board, then the drawing presents a cube, whereas if that point is "pushed" behind the board, we get an example of a trihedron.

It should be taken into consideration that by giving reflex opinions, we mostly operate with terms which are always three-component. [4]

The terms are composed of three components: 1) examples (the lowest level of abstraction), 2) the name (located within the system that is the language we speak, supplemented with the mathematical symbolism, i.e. with the conventional symbols) and 3) the mental image (an internal image, usually given in the form of a simplified icon – the ideogram, which is more durable than the individual impressions in our imagination). If we cannot consider any of the mentioned components, the notion remains unclear and incomprehensible.

The level of examples is very significant in the three-component mathematical concepts where children need to perceive the studied phenomena with all the senses. That is why various models should be presented to them and then asked to use them, to inspect them, to play with them and then to sketch them, to draw them, to diversely construct them, or to present them in the form of the pictogram (that is an iconic sign used to label the simplified ideas, i.e. it is a sign of noting using the pictures, whereas the ideograms are iconic signs that show the mental image) and thus reach the level of the simplest icons – the ideograms – a mental image, which, together with an audible word (appointment) and a symbolic interpretation constitute a necessary three-component abstract phenomenon. This is extremely important when it comes to working with all students because geometric pictures have an integration characteristic. They show all at one point, even more than a thousand words, and thereby stabilise their internal representations and thus significantly contribute to the formation of the three-component form of a studied idea. During the initial teaching process of Mathematics, special attention is focused on the formation of the concepts of natural numbers, relations and operations with them.

A number appears in its three-component form – at the same time as an example, a mental image (a trivial ideogram) and a name – a symbol – by presenting a greater number of relevant models along with the students' sketches done by the same pictogramic, then ideogramic, symbolic presentation, together with the audable language.

E.g. For number 1, we take a number of specific examples (one boy, one girl, one professor, a bench, a chair, a clock, a pen, a book, a sandwich, etc.) and we use the symbol 1 – the word "one" (see Figure 4). We imagine the mental picture of number one as a single dot on a domino. That way, students form a completely clear and integrated, three-component concept of the number one noticing it at the same time as an example, as a mental image and as a symbol (a word). Such interpretations of abstract concepts using the geometric polymorphisms, which have the basic support in the fact that the students' vivid thinking creates the "oh-yes impressions", or the instant "flashes" of complete clarity, totally illuminate the three-component forms of the studied educational problems and give excellent results in terms of knowledge acquisition, i.e. their durability and their usage, which is very important in the teaching process in general, especially when it comes to the sensitive groups of people such as children with special needs. [7]

In the process of acquiring knowledge, the best results are achieved if that knowledge is reached through all the mentioned senses or by the inclusion of most of them. Applying the verbal method, i.e. the monologue and the dialogue methods, we mostly acquire knowledge through the sense of hearing. When it comes to the application of the textual method, we generally acquire knowledge through the sense of sight. However, applying a combination of the illustrative-demonstrative and the verbal-textual methods, we acquire knowledge through all the senses so we come to the full disclosure of all the components of the term more easily. The polymorph aspect of such a perception is a major reason for the more efficient effect of this combination of methods, expressed by acceleration of the process of adoption and formation of concepts by the students in regards to the way of acquiring knowledge by the isolated verbal-textual method or the illustrative-demonstrative method. Because of that, in the contemporary teaching of Mathematics, these two methods should be applied combined in the form of a polymorph unity of their methodical forms. Based on the analysis of R. Arnheim's attitudes towards visual thinking [5] and the studying of the concepts of the relationship between thinking and speech by L. Vigotsky [6], observed in the light of the possibility of implementation of M. Marjanović's synthesis about the three-component idea, yet based on the decades of our experience in the direct teaching of Mathematics in secondary schools and the contemporary didactic tendencies which are based on the laws of dialectics, we conclude that the illustrative-demonstrative

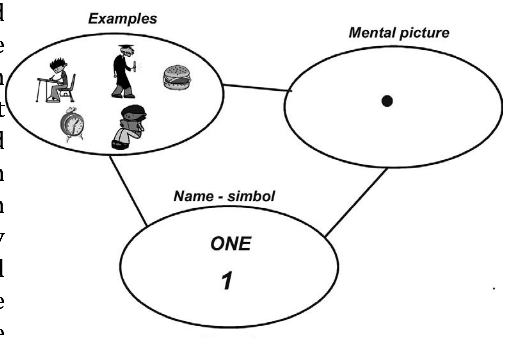

Figure 4.

method, combined with the verbal-textual method, provides a range of unimagineable possibilities for the most effective implementation of the polymorph principle.[b] [9] This should be especially emphasised when it comes to its application in the form of the substantive components of teaching, i.e. the geometric polymorphism of the "Saring type".[c] The answer to the question Why is it so? lies in the aforementioned facts as well as in the fact that visual thinking (thinking through images) has a feature of comprehensiveness, i.e. implementation that causes the well-known effects of the"oh-yes impressions", which are accelerated by different representations of the same example with the relevant methodical details of the illustrative-demonstrative method. The simplest of problems appear this way with, for instance, the pictogram recordings, which creates easier formation of the ideogrammic forms of mental images through, if I may notice, the "oh-yes" noticing of the three-component structure of the concept, i.e. the kinds of the polymorph forms of the principle of evidence.

Consequently, it sounds as an almost unbelievable fact that polymorphic combinations of the illustrative-demonstrative method and the verbal-textual method did not find enough space within the methodology of teaching Mathematics in primary and secondary schools and therefore in the practical application in the classroom.

In the process of perceiving the mathematical content, the universal method should activate students' all five senses (sight, hearing, touch, taste, smell). Thus, this method must be able to encompass the integral combinations of the classical verbal-textual and illustrative-demonstrative teaching methods. This is clear if we bear in mind that

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[b] The didactic polymorph principle, according to what we have achieved to see in the Mathematical-methodical bibliography over the decades of practising teaching Mathematics in secondary schools, does not seem to be much of a special didactic form, and if it is applied occasionally, then it is used quite rarely, intuitively, spontaneously, solely and accidentally in the teaching of Mathematics in elementary and secondary schools. The basis of the polymorph principles, unlike the principle of permanence, is the double or multiple application of the law of negation of the negation to the same phenomena, i.e. the initial problems or known theories. The essence of this important didactic principle is reflected in the permanent insistence on the integral perception of different approaches of understanding and comprehension of the studied teaching phenomena. Its exploitation in practice requires teachers' excellent knowledge and skills to apply their diverse professional-didactic-methodological capabilities and also induces students' intense cognitive activity, expressed through quality individual work and greater motivation. Efficiency of the polymorph principle is based on the evident psychological fact that changes and diversity in work update the process of teaching, whereas monotony mainly induces weakening of interest and the appearance of passivity and boredom. That is why, in the teaching of Mathematics, the polymorph principle should have a universal role which would be presented by enriching the teaching process with a variety of teaching contents, resources, procedures and methods. When it comes to the content itself, it is mentioned in regards to the choice of such tasks that allow a larger number of diverse approaches in their solution as well as the use of teaching aids. However, organising such classes requires adequate implementation of the polymorph forms of methodical and methodological details of classes, i.e. their variations during the same class. Methodical forms and methodological details that the teacher plans and applies during the classes are based on timely implementation of didactic principles, which is manifested in their simultaneous polymorphic-cohesion influence, that is – an integral dialectical unity.

[c] Such polymorphisms referto a variety of way for solving geometric tasks that use drawings and geometric images of the simple and the most possibly regular shapes, such as a triangle, a square, a circle, etc.

each mathematical concept is in the three-component form and virtually of a smaller or larger degree of abstractness so that, by illustrating and demonstrating with appropriate verbal methodical interpretations, we easily come to the level of mental images, i.e. the small icons as the dominant carriers of information, which, together with the level of symbols – the words and the level of the examples, allows the students a clear understanding of the studied mathematical phenomena.

In **learning through discovery**, as a form of interactive learning, the content that students need to acquire is not presented as a finished product, but it has to be discovered. That gives the students the increased intellectual power, motivation and learning activities, where the feeling of satisfaction occurs because of the work performed. Learning through discovery has major effects in terms of memorising the learned material because students invest their own efforts to organise newly acquired information within their own information system to find the information they need, thus increasing their capacity to organise and classify the data.

Productive thinking as mathematical thinking according to (Malinović, Malinović-Jovanović, 2002) is logical thinking, or an opinion which builds the mathematical concepts, that operates with these concepts and reveal the relationships and dependencies among them, that is – reveal the mathematical truths (or facts). Therefore, thinking forms the notions of objects and phenomena (in the broadest of terms) and objective relations and dependencies among them occur as well as the rules prevailing in the particular field of concepts. According to (Antonijević, R. 2011), simultaneously with the formation of a system of mathematical knowledge and concepts, mathematical thinking is developed in students in the teaching process through the content of teaching Mathematics that relate to the nature of mathematical knowledge and the concepts of the teaching content. Carpenter and Levi (Carpenter and Levi, 2000) pointed to the fact that teaching should form students' development of thinking that needs to be moving from arithmetic to algebraic thinking and reasoning along with generalising and formalising.

Learning by discovery has an undoubted advantage over receptive learning, which is direct and communicated in the completed forms. This learning is more complex as a method of learning than problem solving as a form of learning with the aim to incorporate a particular method of learning in itself.

The requirement that knowledge in teaching becomes acquired by the students through their productive and self-employed work was set by the reform of Pedagogy in the late 19th and early 20th century as opposed to the passive reception of knowledge that characterised the old school of learning. The students' independent work was applied in the process of teaching even before the reform of Pedagogy, but it was of a reproductive character. In the reproductive work, the main purpose is firming, determining and application of acquired knowledge in the classroom.

THE METHODS

The sample of respondents

The research included the 8th grade students from Elementary School "Dositej Obradović" in Irig, Serbia, Elementary School "Milica Stojadinović Srpkinja" in Vrdnik, Serbia, Elementary School "Veljko Petrović" in Begeč, Serbia and Elementary School "Vuk Karadžić" in Novi Sad, Serbia during the school year of 2014/2015. There were both the experimental and control groups in all the schools. The total sample equals 298 students from 14 classes. Both the experimental and control groups had 149 students each. **The methods** applied in this study were the experimental and descriptive methods.

The experimental method was applied in the manner of an experiment with parallel groups. Two groups of respondents were formed, seven classes from each school, an experimental and a control group. By introducing the independent variable of learning through **the method of self-knowledge polymorphic heuristics** in the experimental group, I tried to determine its effect on knowledge and the students' productive thinking.

The descriptive method was used for data collection, processing and the interpretation of the data as well as for drawing conclusions. The procedures applied in the research are work on pedagogical documentation and testing.

An insight into the pedagogical documentation was completed using the class register books of all the classes in the survey. The data collected from the class register books are related to the students: school name, grade, class, a list of students (students' full names), students' gender, success at the end of the first semestre, the marks in Mathematics and the parents' education level. The respondents, experimental and control groups were all tested twice – with the initial test before the introduction of the experimental factor and with the final test after the introduction of the experimental factor.

The research instruments used are the tests (the initial and the final one) and the record sheets for students and teachers.

For the purposes of this research, the constructed tests were as follows:

- TIUPO – a test to determine the initial state of the students'knowledge and skills of productive thinking;
- TFUPO – a test to determine the final status of the students' knowledge and skills of productive thinking.

The initial test contains 10 tasks, whereas the final one contains 11 tasks.

THE RESULTS AND DISCUSSION

In order to collect data for our research on the effectiveness of learning through the method of self-knowledge polyform heuristics to the knowledge and ability of productive thinking in relation to receptive learning, I formed 2 (two) tests – the initial and the final test, based on which I tested students in the mentioned field. The initial test was conducted before and the final test after the experimental programme for a period of 11 school classes. We then conducted a statistical analysis of the obtained results as well as the interpretation of the results.

Table 1 *Results by the initial test tasks*

Tasks	1	2	3	4	5	6	7	8	9	10
E-group	60.07	50.63	51.17	46.59	29.36	17.56	73.29	33.46	32.75	28.66
C-group	76.85	44.44	54.28	39.71	25.39	16.69	65.03	30.05	21.01	30.04

Legend: The initial test results for both the experimental and control groups by the tasks.

After the initial measuring, an experimental programme was introduced into the experimental group for a period of 11 school classes. Students were taught using **the method of self-knowledge polyform heuristics** in the teaching of Mathematics with the specially prepared material after which the final measuring was performed.

Table 2 *The final test results*

Tasks	1	2	3	4	5	6	7	8	9	10	11
E-group	82.6	95.2	86.2	87.4	64.1	86.8	83.4	84.2	73.5	73.4	73.3
C-group	76.5	86.4	78.4	74.8	47.1	77	56.3	62.6	35.9	53.4	42.5

Legend: The final test results for both the experimental and control groups by all the 11 tasks.

Comparative results of the initial and the final tests

The experimental group students won 6,794 points on the initial test (or 32.57%), whereas the control group students won 6,255 points or (29.99%). Based on the results of the initial test, I concluded that the students from both groups were equal according to their foreknowledge. On the final test, the experimental group students won 16,962 points (or 81.31%), while the control group students won 13,152 points (or 63.05%).

Analysis of covariance

Using the analysis of covariance, I tested the significance of the differences among the multiple arithmetic means, i.e. the differences among the arithmetic means that resulted from the variability within the groups and between the groups. We sought to determine whether the differences between the groups were larger than the differences within the groups.

The variance of the initial test between the experimental and control groups is Fx=1.27 and is not statistically significant. The variance between the experimental and control groups at the final test is Fy=46.97 and is statistically significant at the 0.01 level, which means that there are differences between the control and experimental groups, which were created under the influence of the experimental factor.

Table 3 *The variance between the experimental and control groups*

Variance source	df	SSy	SSx	MSy	MSx	Fy	px	Fx	py
Between the groups	1	38,427.70	974.90	38,427.70	974.90	46.97	Insignificant	1.27	0.01
Within the groups	297	242,158.20	228,062.80	818.10	770.48				
Total	298	280,585.90	229,037.70						

Analysis of covariance

Covariance eliminates the need to create equivalent groups because the results of the initial measuring affect the results of the final measuring in the way that in the process of the analysis of the variance of the final measuring, certain adjustments are made with respect to the initial results. The resulting covariance F speaks of considerable progress of the experimental group under the influence of the experimental factor.

Table 4 *T he covariance between the experimental and control groups*

Covariance source	Σx2	Σxy	Σy2	df	Σy′2	ms	F	0.05
Between the groups	974.90	6,891.20	487,11.70	1	45,266.80	45,266.80	4.15	3.84
Within the groups	799,416.30	200,159.10	3,270,779.20	295	3,220,663.00	10,917.50		
Total	800,391.20	207,050.30	3,319,490.90	296	3,265,929.80			

Checking of the significance of the difference between the two arithmetic means, the t-test and the final test

The t-test for initial and final measuring was conducted in the further statistical data processing.

- **T-test results for initial measuring**

Df=N1 + N2 – 2=296; Dm=3.62; SEdm=3.22; t=1.12

Based on the comparison of the results of the computed value (t=1.12) with the limit values, 296 degrees of freedom and on the set significance level of 0.05 and 0.01, I conclude that the difference between the arithmetic means of the initial test points between the E and C groups is statistically insignificant at selected levels of significance because the calculated *t* equals less than the specified limit values. Therefore, the experimental and control groups are no different by the average results on the initial test.

Table 5 *The t-test result for the initial results*

	1	2	3	4	5	6	7	8	9	10	Total
Dm	0.67	0.56	0.25	0.83	0.48	0.26	0.83	0.59	1.17	0.17	3.62
SeDm	0.13	0.32	0.28	0.14	0.42	0.43	0.64	0.5	0.34	0.31	3.22
t	5.27	1.76	0.87	2.04	1.13	0.6	1.29	1.19	3.43	0.56	1.12

	C-group	E-group
N	149	149
M	41.98	45.60
σ	28.89	26.38
SEm	2.38	2.17

- **T-test results for final measuring**

Table 6 *The t-test for the final results*

	1	2	3	4	5	6	7	8	9	10	11	Total
DM	0.24	0.80	0.62	1.50	2.04	2.95	2.70	4.33	3.76	1.99	4.63	25.57
SEDm	0.12	0.23	0.24	0.36	0.48	0.74	0.43	0.71	0.43	0.50	0.61	3.21
t	1.99	3.54	2.59	4.16	4.24	3.97	6.32	6.12	8.70	4.03	7.60	7.96

	C-group	E-group
N	149	149
M	88.27	113.84
σ	32.10	22.32
SEm	2.64	1.83

Df=N1 + N2 – 2=296; Dm=25.57; SEDm=3.21; t=7.96

Based on the comparison of the calculated value (t=7.96) with the limit value, 296 degrees of freedom and with the set significance levels of 0.05 and 0.01, I conclude that the difference between the arithmetic means of the final test points between the E and C groups is statistically significant at the selected levels of significance because the calculated *t* exceeds the above stated limit values. Thus, the experimental and control groups differ in their average scores on the final test. Based on the obtained results of the statistical procedures, I conclude that the experimental factor affected the students' success in the experimental group significantly, thus confirming the hypothesis and the aim of this paper. The application of modern methods of teaching Mathematics, using **the self-knowledge polyform heuristics** with the help of computers (as in the example of introducing the "Linear functions" topic in 8th grade of elementary school and the use of the Desmos Graphing Calculator (an online tool), affects the increase of knowledge which is reached by the students through the individual work at their own pace under the guidance of the teacher; they work on the contents that develop their productive thinking. This way of teaching should be present to the greatest possible extent in the teaching of Mathematics.

Taking into account that the tasks are ordered by their difficulty from the easier ones to the harder ones in accordance to Bloom's taxonomy, it is important to stress that during the research programme, both groups worked on the same types of tasks. A large number of the tasks in this experimental programme are also found in the Textbook and in the practice book of Mathematics for 8th grade – in other words, the test did not include a single type of tasks that the students from both groups had not come across in the previous learning process. The basic difference is that the students from the E group acquired knowledge and solved the problems by themselves with the help of computers and with the occasional conduct by the teacher, whereas the students from the C group were completely led by the teacher. Therefore, when it was necessary for them to solve a problem, the students faced difficulties and could not solve them correctly. The differences in productivity were significantly expressed in the tasks that required a higher level of productive thinking such as synthesis and evaluation. I conclude that the knowledge acquired due to the application of the method of self-knowledge polyform heuristics in learning is of higher quality, the students' thinking is productive and allows them to solve problems, they have a greater knowledge transfer, and knowledge acquired and used this way lasts longer.

CONCLUSION

The development of information systems has caused the need for transforming the teaching process with the learning process also. Introducing computers in the sphere of teaching and the crisis of the traditional educational system led to the development of an educational technology concept that evolved from the realisation that it should include the application of audiovisual means with a systematic approach and new learning strategies based on the information technologies. What characterises this new system is the media message sent from the computer (received at school or which affects the type and quality of learning outside it), the methods of teaching and organisation of the teaching process. The quality of the teaching process can be significantly improved by using a large number of software packages with the Mathematics content as well as using the website presentations which deal with mathematical issues. Computers are a teaching medium which chief function is learning how to seek information, not learning the information by heart; it is about learning how to learn and how to solve problems; it also allows the realisation of the method of searching and discovery. The use of computers in the process of teaching Mathematics helps students adopt not only the mathematical knowledge but also learn and use computers. It allows them to be the active participants in the teaching process, which makes such a process more interesting, thus achieving a higher level of learning, developing logical and mathematical thinking, systematicity, accuracy and precision in work, and also forms the basis for intellectual and creative development. A contemporary educational process seeks the teaching methods and forms which will encourage students to actively participate in the teaching process.

Teaching methods need to be interactive and to enable the two-way communication which will aim at developing students' intuitive thinking and at encouraging them to solve the problematic situations individually as well as to reach and acquire some new knowledge. Computers are slowly in the process of finding their place although they are generally underused in the process of teaching. The possibilities of their use in presenting educational content are becoming obvious.

Teachers are not familiar enough with the computer software with the mathematical content nor with the possibilities that it offers in the process of tuition, but there is willingness present which leans towards an approach to organised education in order to take advantages provided by computers to further realise an interactive teaching process in which students would acquire knowledge through their own discoveries. According to contemporary educators, learning through students' own discoveries is extremely important since learning is an individual act and it allows each student to reach self-realisation and the achievement of personal maximum, where adopted knowledge is of a lasting character. Interactive teaching, realised with the use of computers, also enables students to acquire knowledge at their own pace, dwelling on the teaching content as long as it is necessary for them to acquire it completely. The polymorph of apparent perception, along with the adequate implementation of an efficient combined effect of multiple methods, accelerates the processes of adoption and the formation of concepts by students in regards to the way of acquiring knowledge using the isolated verbal-textual method. That is why modern teaching of Mathematics should include the combinations of the verbal-textual, illustrative-demonstrative and laboratory-experimental methods; it should further present them in the form of a polymorph unity of their methodical forms of **the method of self-knowledge polyform heuristics**.

The polyform priciple is a notion that is wider than the geometric polyformism since, in addition to the geometric polyformism, it includes all non-geometric polyformisms. From the standpoint of Mathematics, if the didactic polyform principle is presented by the set A, and the phenomenon of the geometric polyformisms is presented by the set B, then $B \subset A$. It is clear that one can ask the following question: Is it possible to prove that we deal here with a principle? An elementary proof was given by the first author of this paper as follows:

If it is indisputable that the evidence (presented as trivial proofs by applying the laws of logic) is a principle, and the permanence (the preservation of formal laws) is also a principle, then every chain of conjuctions of a finite number of evident geometric or non-geometric proving activities or multiple conjuctions of permanences is also a tautology, i.e. a principle, since $T \wedge T \wedge \ldots \wedge T \leftrightarrow T$. [9] In this paper, in the implicit sense, we experimentally showed the effectiveness of this principle in the implicit form.

The benefits of learning through the method of self-knowledge polyform heuristics are:

Diversity, dominated by the geometric polymorphisms along with a combination of arithmetic, algebraic and methodological diversity, represents the polymorph teaching principle, which is based on a finite number of logical conjunction laws or principles (such as: laws of negation of the negation, modus ponens, the principles of obviousness, permanence, etc.). The essence of this important educational principle consists of the permanent insistence on the integral perception of various obvious, especially geometric, approaches to understanding and comprehension of the studied teaching concepts. In practice, this requires teachers' excellent knowledge and skills about how to apply their diverse professional-didactic-methodological possibilities, yet induces students' intense cognitive activity, expressed through quality individual work and greater motivation. Teaching, as viewed in the light of such principled settings, includes also the new polymorph methodical approaches. In learning through self-knowledge polyform heuristics, as the dominant method within the polymorphic principal settings of interactive teaching, the content that needs to be acquired by students is not presented as a finished product but it has to be disclosed, preferably in different ways. Intellectual power therefore rises in students as well as motivation and activation during learning, which is followed by the feeling of satisfaction due to the work performed. Learning through the method of self-knowledge polyform heuristics has some greater effects in terms of acquisition of contents, and especially the process, i.e. applicable knowledge in terms of modern taxonomy knowledge, because the student invests personal effort to organise the newly acquired information within the personal information system and also to find the whole range of information needed, thus increasing personal capacity to organise and classify the data using the deductive and analytical-synthetic approaches as well as to apply them in various problematic, and even life, situations.

According to many researchers, contemporary teaching, which is a compound of principled and methodical combinations with the help of computers, and which is not known nor recognized by the traditionalist school, contains new qualities of diverse teaching, increases the activity of students in the process of teaching and knowledge acquisition and affects their greater motivation, curiosity, initiative, creativity and applicability of acquired knowledge in everyday life, which are the main objectives of the contemporary teaching of Mathematics. Such studies are rare in our country yet quite applied worldwide.

The self-knowledge heuristic method is the very method which is essential to the contemporary teaching and which will be "discovered" and affirmed by the 21st century school. We are convinced that it will finally take the title of universality through practicalrevelation and resurrection.

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EFFECTIVENESS OF ULZIBAT® SURGERY METHOD «GRADUAL FIBROTOMY IN ORTHOPEDICS» FOR THE TREATMENT OF MUSCULAR FIBROTIC CONTRACTURE IN CHILDREN WITH CEREBRAL PALSY (ICP)

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SUMMARY

Purpose: to evaluate the efficacy of the Ulzibat® surgery method in the rehabilitation of children with cerebral palsy.

Methods: the study involved 83 patients aged 2.6 to 13.4 years with spastic forms of cerebral palsy. The average course of treatment was 2 stages. The follow-up period was 2-5 years. To assess the degree of motor disorders before and after treatment used the conventional scale GMFM-88. Patients before and after surgical treatment were divided into 5 groups of levels of motor activity.

Results: After treatment in all groups we observed a significant increase in total score in average by 23 points. There were a positive correlation between the difference in scores before and after treatment and the level of motor skills (r_S= 0,4 $p<0,05$), a negative correlation with age of operation (r_S= -0,5 $p<0,05$). Most children after surgical treatment moved to a higher level of physical activity. The number of children with minimal disruption in motor activity (1st group) after treatment has doubled, and the number of children with the most severe disorders (4th and 5th group) was halved. Most of the children showed improvement either within their group movement activity (39%) or transition on level 1 above (49%). 12% of patients were passed on 2-4 levels above.

Conclusion: The Ulzibat® surgery method has shown high efficiency in the rehabilitation of children with cerebral palsy with different the severity of the disease. The most pronounced effect noted in the course of surgical treatment at an early age (3-7 years).

Key words: cerebral palsy, surgery, rehabilitation, Ulzibat method, gradual fibrotomy

INTRODUCTION

Cerebral palsy (CP) is the one of the most commonly occurring childhood physical disability (1). The prevalence of cerebral palsy is 2-4 cases per 1,000 children (1, 2). The most common form of cerebral palsy in all age groups is the spastic form, which occurs in 80% of cases(3). High prevalence of cerebral palsy, the severity of clinical manifestations, early disability patients make the problem of treatment of patients with this pathology is extremely relevant and socially important. Rehabilitation of children with cerebral palsy is a lengthy and time consuming process, due to the early formation of pronounced contractures and the formation of vicious poses.

One of the modern effective surgical treatments for the effects of cerebral palsy is GRADUAL FIBEROTOMY BY V.B. ULZIBAT. Surgical removal of contractures by this method allows in short terms to increase the amount of motion in the joints, improving motor function in the affected segment, reducing pain, improving the quality of life of patients and facilitating the care of patients with severe form of the disease. In addition, the technique is minimally invasive.

The method of gradual fibrotomy is a way to remove muscle contractures and myofascial pain syndrome, based on gradual subcutaneous decision of fibrously modified muscle fibers using a special scalpel.

Pathogenetic substantiation used for the surgical treatment of patients with congenital and acquired disorders of the musculoskeletal system by Ulzibat® method were the results of clinical and instrumental and morphological studies conducted by the Institute with the participation of independent medical experts. It was established that one of the causes of muscle dysfunction, myofascial pain and movement disorders in various diseases of the musculoskeletal system is the development of skeletal muscle in dystrophic and sclerotic changes. Exodus expressed dystrophic process is the fibrosis of the muscle fibers, the formation of organic muscular contractures – fixed shortened and compacted muscle areas, painful on palpation and does not disappear when the muscle relaxation (4).

The ultimate goals of surgical treatment by the Ulzibat® method are to increase volume of movement in joint, to prevent development of heavy bone and joint deformation, to decrease hidden and explicit pain syndrome.

While the method has a number of advantages. Minimal trauma (Short operation time (approx 15 MIN), so the anesthesia time is the same short. No skin cutting, only puncture. No surgical suture. No after operation immobilization). Operation possible on all superficial muscles (muscles of legs, arms, back, neck, head; flexors and extensors).

The method can be used for treatment muscular contractures of various origin: cerebral palsy, stroke, post traumatic diseases and other brain diseases with spastic manifestation.

In addition the patient does not need a long time to stay in the hospital, he can be discharged the next day after surgery. Also the next day after surgery patient can seat and move in the bed without any restriction. Through 3-5 days after surgery patient can crawling, and through 14 days can stand on feet. Active rehabilitation is possible in one month since the operation.

Of course as with any surgical procedure there may be some complications: postoperative hematoms in operated zone (20-30%), the treatment of which typically requires only the application of alcohol compresses; anesthesiological complication (2-5%); injury of main blood vessel (less 1%); injury of main peripheral nerve (less 1%).

Over 25 years of existence method, operated on more than 45,000 patients with diseases of musculoskeletal system (over 37,000 children), of which 84.5% of the patients with cerebral palsy.

Thus, we studied.

The purpose of study: to evaluate the efficacy of the Ulzibat® surgery method in the rehabilitation of children with cerebral palsy.

MATERIALS AND METHODS

The study involved 83 patients aged 2.6 to 13.4 years with spastic forms of cerebral palsy. The average course of treatment was 2 stages. The follow-up period wasof 2-5 years. To assess the degree of motor disorders before and after treatment used the conventional scale GMFM-88 (5) to assess motor 88 acts on 5 categories: A – lying and rolling, B – seating, C – crawling position on knees, D – standing, E – walking, running, jumping. The total score was calculated in % of the maximum score.

Patients before and after surgical treatment were divided into 5 levels of motor activity:

I) Sitting, alone gets up and walks without additional support, runs, climbs the stairs; **II**) Difficult to balance when sitting, stands up independently, crawls, walks with additional support; **III**) Sits up with help, crawls, walks a few steps with additional support; **IV**) Sits down and sits with assistance, move around the room by rolling or crawling, not walking;

V) Limited all levels of movement, not sitting, not crawling, not walking. For different age groups, there are certain criteria for the distribution of motor activity through the levels.

Statistical processing of the obtained data was performed using the statistical software package Statistica 6.0 (USA). Data are represented as mean values. To compare two dependent samples qualitative test was used χ^2.

To analyze the relationship of the two signs was used in the analysis of rank correlation by Spearman. For all benchmarks and tests differences were considered significant at $p<0.05$.

RESULTS

Clinical characteristics of 5 groups of patients, divided according to the levels presented in **table 1**.

Table 1

	Level of physical activity				
	I	II	III	IV	V
The number of patients	15	15	19	16	18
Age, years	5,5 (3,1-13,1)	5,8 (2,6-13,4)	4,9 (2,6-8)	6,1 (3-10,5)	4,5 (2,7-6,3)
Spastic tetraparesis	1	0	5	8	12
Spastic hemiparesis	9	4	0	0	0
Spastic diplegia	5	11	14	8	6
The average score before treatment (min-max)	80 (63-92)	78 (61-87)	62 (50-72)	46 (26-57)	17 (2-40)

The distribution of patients according to level of physical activity before surgery and their clinical characteristics

After treatment in all groups we observed a significant increase in total score ($p<0.05$) in average by 23 points. The total difference scores were higher, the worse the initial level of patients (Fig.1). So, in group I with minimal motor impairment total score increased by an average of 17 and has almost reached 100. In group II was also observed almost complete restoration of motor skills, the total score increased by an average of 18, from 78 to 96 points. In III, IV, V groups, the total score increased by 26, 29 and 23, respectively. In the first groups, a small difference in scores due to the initially mild loss of motor skills in patients, that is, the children in these groups after treatment reached normal or near normal physical activity. But, obviously a significant improvement of motor skills in children with severe impairments.

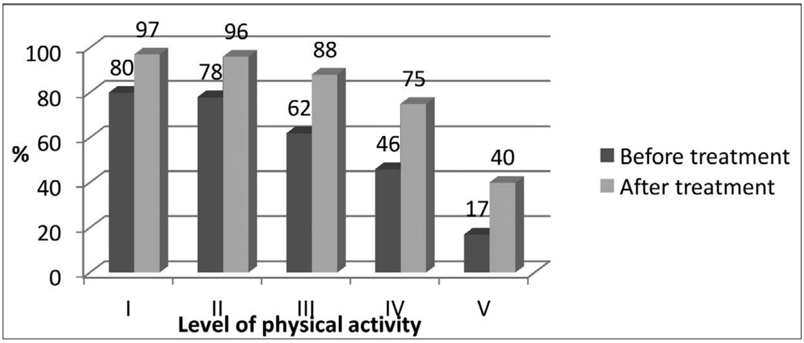

Figure 1 The total score of the motor activity before and after treatment by the Ulzibat® method in the patients of 5 groups

Correlation analysis confirms a direct positive relationship between the difference in scores before and after treatment and the level of motor skills (r_S= 0,4 p<0,05). Also revealed a negative significant association between the difference score before and after treatment and age of operation (r_S= -0,5 p<0,05). Thus, the sooner the surgery is performed, the better the treatment outcome. As a result of this treatment changed the distribution of children into groups according to level of motor skills (Fig.2).Most children after surgical treatment moved to a higher level of physical activity. So, if before the treatment in the 1st group with a minimum of movement disorders was 18% of children after treatment, this group made up the majority of patients – 40%.In addition, we see significant improvement in the group of children with low movement (V group). After surgery, the percentage of children in this group was halved, from 22% to 9%.

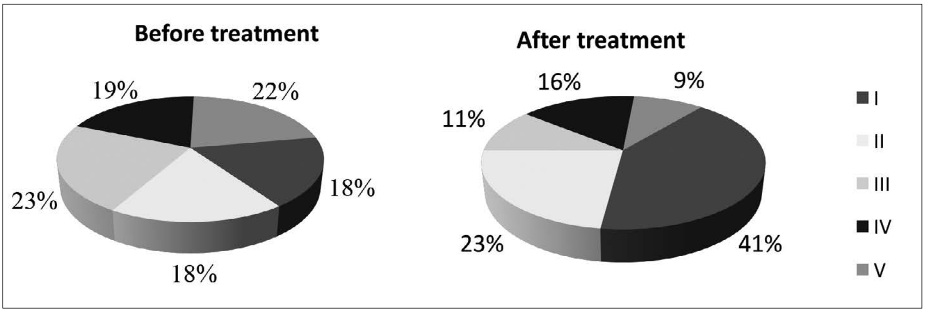

Figure 2 The distribution of patients by levels of motor activity before and after treatment by the Ulzibat® method

It should be noted that the degree of improvement of motor skills in children was different. Most of the children showed improvement either within their group movement activity or transition on level 1 above (table 2).So 39% of children improved their performance, but remained in the same group, and 49% improved the performance so much that switched to 1 level up. A lot of children, 8.4% moved to 2 levels above. Also 3 children of the 83 showed so marked an improvement in the movement skills that were passed on 3 and 4 levels above.

Table 2

The degree of improvement of motor skills	The number of patients	% patients
Within the initial level	32	38,6
With the transition to the 1 level up	41	49,4
With the transition to the 2 level up	7	8,4
With the transition to the 3 level up	2	2,4
With the transition to the 4 level up	1	1,2

Distribution of patients according to the degree of improvement in motor activity after treatment

The degree of improvement of motor skills (within initial level and with the transition to a higher level) in five groups of patients is presented in **figure 3**. In group 1 with minimal disruption, all 15 patients showed improvement of skills within their group. In 2 group 80% of patients moved on his movement skills in group 1. In group 3, more than 70% of patients after treatment have moved to the second group, 15% to the first. In 4 group – third of children improved motor skills within its group, a third – moved to the group above, almost 20% – is moved to the second group, and 2 children moved to 1. In the 5, the heaviest group, about 40% of children improved their performance within their group, just over 40% moved to level 4, 2 kids – third level, and 1 patient at fist level.

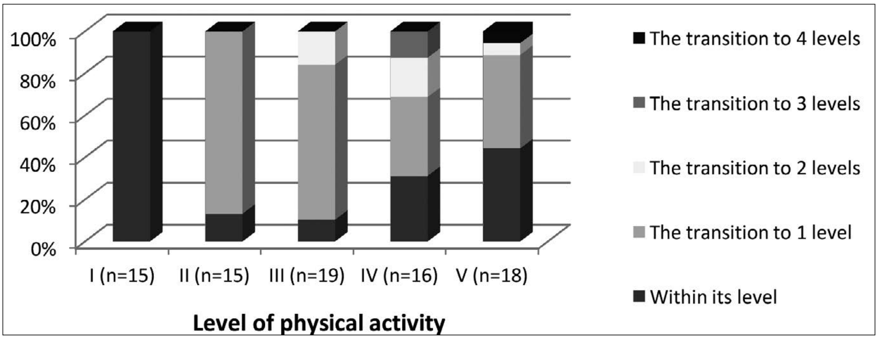

Figure 3 Improved motor skills after treatment in patients with different initial levels of physical activity.

CONCLUSION

The Ulzibat® surgery method has shown high efficiency in the rehabilitation of children with cerebral palsy. Improving motor skills is noted in patients of all 5 levels of physical activity. Even in patients with severe motor disabilities there is a strong positive trend. The method is effective in any age period, but more pronounced results are achieved in the age group of 3 to 7 years. The advantages of the method – quick increase of volume of movement in joints after elimination of muscle contractures, which in addition to pronounced self-effect, significantly increases the effectiveness of other rehabilitation measures, and potentiates their action. In addition, an unquestionable advantage of the method is it's minimally invasive, especially given the large percentage of children of smallage and concomitant pathology. Given the above advantages, we can assume high economic efficiency of the method by reducing the duration of treatment, a pronounced effect recovery of motor function with a decrease in the degree of physical disability. It should be noted that simultaneously with the return of motor activity from a large number of patients showed improvement of speech, intellectual-mnestic functions, the acts of chewing and swallowing. Such observations suggest that the improvement of motor function, reduction of pain syndrome leads to the activation and functioning of the entire nervous system, not just the motor center responsible for the segments subjected to surgical interference.However, this assumption needs further detailed research.

Thus, the Ulzibat® surgery method being high-effective and minimally invasive, can be widely put into practice in patients with cerebral palsy that will accelerate and facilitate subsequent rehabilitation.

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MEASUREMENT AND COMPARISON OF GAIT PATTERN CHARACTERISTICS IN MOVEMENT DISORDERS PATIENTS AND HEALTHY SUBJECTS

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SUMMARY

Gait is not considered as an automated motor activity that uses minimal cognitive input – even in healthy adult subjects the strides fluctuate. Neuropsychological influences on walking are studied in many areas of research. Studies in healthy subjects describe the impact of brain executive function and attention impairment on gait performance. This impact shows great variability during central executive functioning in complex gait situations, such as dual task performance while walking. Dual tasking paradigm relies upon executive function and the ability to divide attention during different tasks during gait, while subjects perform given motor or mental tasks while walking. Comparing parameters of gait and extracted data in neurological disorders and diseases – Parkinson's disease, with or without present dementia or depression, Progressive supranuclear palsy, Alzheimer's disease, multiple sclerosis or other diseases could help to separate different forms of movement disorders and provide follow-up during disease progression and its impact on gait function. Differences in the pattern relatively specific for the disease could point to potential postural instability and warn for possible falls in complex walking situations. Measurement and gait analysis of spatiotemporal gait characteristics (cycle time, stride length, double support time, swing time and variability of those parameters) in some of the neurodegenerative diseases and gait characteristic and pattern changes during the disease progression could point toward underlying causes of present disturbances and helps in adequate choice of therapy approaches and medication or rehabilitation procedures and therefore improve therapeutic effects.

Key words: Gait cycle, Stride, Gait analysis, Dual task walking, Gaitrite walkway system, Parkinson's disease, Progressive Supranuclear Palsy, Multiple sclerosis

INTRODUCTION

Mobility is the ability to move one's body through space. Clinical impact can be defined in respect to overall function, or can be disease-specific. Indicators of mobility capacity can be obtained from self-report, professional assessment or observed performance. Each source of information has strengths and weaknesses in assessment of mobility capacity: a) self-report measures of mobility are common and often include items related to transfer and walking ability or stair climbing of subject. They may focus on specific limitations or on more general mobility functions. Self-report measures are valuable because they represent the perspective of the particular person, how they see it. In self-report measures, subjects rank the presence of absence of a problem with walking or a walking-related task, with rankings ranging from no difficulty in task performance, to unable to perform the task either with or without different assistance, human or using device such as cane; b) professional assessment of mobility capacity is used in rehabilitation for clinical and reimbursement purposes as a major, but not exclusive, component of disability assessment. These assessments focus on limitations which are present in required tasks; c) performance measures of mobility can be timed or counted scales of a given task such as gait speed, walk time or one foot standing, or can combine different given tasks (Hausdorff and Alexander, 2005). Performance measures are used in specific disease assessments. More complex performance tests of mobility and balance such as the gait abnormality rating scales or balance scales cover more details of body part (Hausdorff and Alexander, 2005). Performance measures can be brief and simple to perform and have strong psychometric properties. They tend to represent performance at one moment in time, and thus are vulnerable to error since there is high day-to-day variability. In some performance measures, small differences in technique can have large effects on results. For example, gait speed measured over a short distance of several meters will have radically different results depending on whether the protocol calls for a standing start or a steady walking speed.

Mobility limitations are present among older adults and they are used to describe aging itself. Among elderly population, mobility problems are increasing with age, cause serious disability and signal risk for multiple serious negative outcomes such as institutionalization and death. Mobility limitations are a major contributor to loss of people's independent life and functioning. The causes of mobility limitations involve the complex interactions of multiple systems. Since so many biological processes influence mobility, mobility dysfunction, defined as abnormal mobility that affect function, is considered as outcome. Mobility dysfunction represents integrated effects of aging and/or effect of disease on health and functioning. Treatment strategies for mobility disorders are broad and diverse and only partially based on evidence.

Gait characteristics

Gait characteristics measurement becomes a powerful tool for mobility and outcome function assessment. Measures of gait characteristics are usual and maximal gait speed, 6 minutes walk test, long corridor walk, sets of multiple tasks while walking, such as functional ambulance classification, gait abnormality rating scale, timed-up-and-go test, dual task walking, etc.

Furthermore, measurement of spatiotemporal gait characteristics includes and calculates parameters such as duration of gait cycle, gait velocity, stride length, single and double limb support, swing time, and variability of those parameters. Therefore, gait analysis could provide information about profiles exerted by each foot to the ground during walking and gait symmetry, or asymmetry, between legs. Comparison of data extracted and analyzed would help to separate different forms of disorders, some of the disease characteristics and provide follow-up during disease progression.

Figures 1 and 2 represent phases of gait cycle and illustrate how gait phases relate to each other. Also, difference between step and stride is depicted, such as that two steps amounting to one stride. Figure 2 presents the simple software screen display how footprints are registered and calculation and preliminary values of step and stride characteristics.

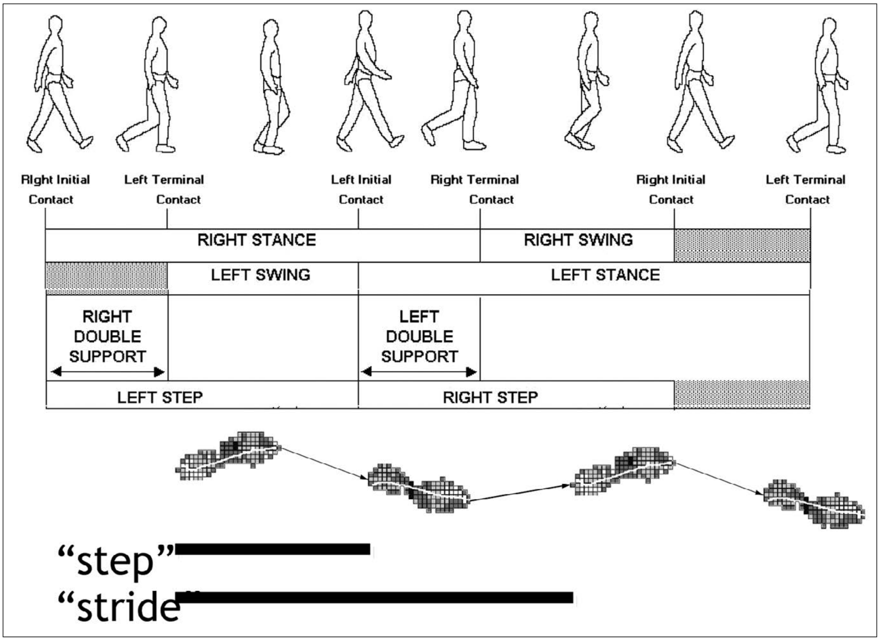
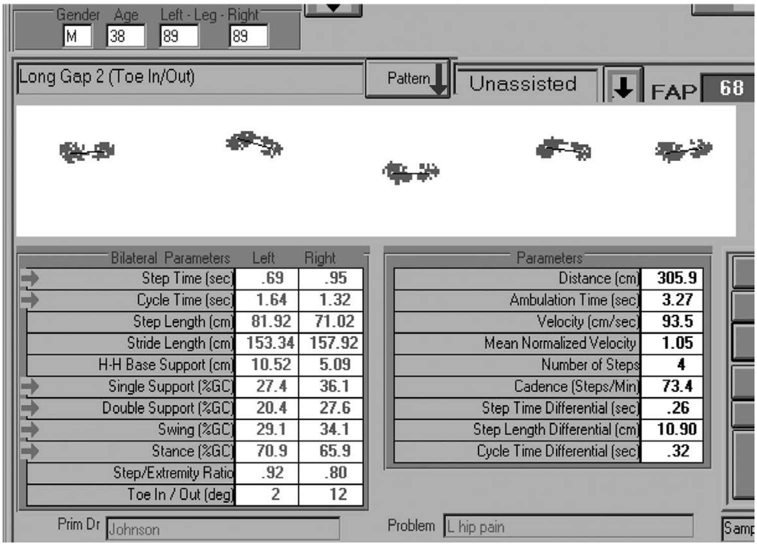


Figure 1 Phases of gait cycle, with swing phase and double support phase were depicted. Note the difference between terms step and stride



Gender M Age 38 Left - Leg - Right 89 89

Long Gap 2 (Toe In/Out)

Unassisted

Bilateral Parameters	Left	Right
Step Time (sec)	.69	.95
Cycle Time (sec)	1.64	1.32
Step Length (cm)	81.92	71.02
Stride Length (cm)	153.34	157.92
H-H Base Support (cm)	10.52	5.09
Single Support (%GC)	27.4	36.1
Double Support (%GC)	20.4	27.6
Swing (%GC)	29.1	34.1
Stance (%GC)	70.9	65.9
Step/Extremity Ratio	.92	.80
Toe In / Out (deg)	2	12

Parameters	
Distance (cm)	305.9
Ambulation Time (sec)	3.27
Velocity (cm/sec)	93.5
Mean Normalized Velocity	1.05
Number of Steps	4
Cadence (Steps/Min)	73.4
Step Time Differential (sec)	.26
Step Length Differential (cm)	10.90
Cycle Time Differential (sec)	.32

Prim Dr Johnson

Problem L hip pain

Samp

Figure 2 Measured gait parameters presented as divided between left and right leg. Measured gait velocity or cadence could also be measured and analysed

Gait pattern characteristics measured by electronic force-sensor walkway carpet system and clinical gait analysis

Gait alterations are generally observable phenomena in movement disorders patients. Analysis of gait pattern could point toward underlying causes of present disturbances and helps in adequate choice of therapy approaches and effects. Monitoring of gait by experienced clinician may characterize main features and present disturbances and is often sufficient for characterization of gait. In contrast to simple, but subjective medical examination are gait analyses with expensive and complex devices that also require long and complicated data analysis by specially trained persons. System of gait analysis by electronic force-sensor walkway carpet system could provide information about force profiles exerted by each foot to the ground during walking. What is important is that it is relatively inexpensive and easy to use. Walkway system provides the spatial and temporal pattern of the contact between the foot and the ground, and furthermore the information about the characteristics, level of gait stability and quality of gait, and consequently significantly improves clinical management of disturbed gait pattern in movement disorders. Comparison of data extracted and analyzed from walking electronic carpet would help to separate different forms of disorders and provide follow-up during disease progression, further facilitating the need for the introduction of these simple and not-too-expensive methods in everyday clinical practice.

System of gait recording and analysis by electronic force-sensor walkway carpet system provides information about force profiles exerted by each foot to the ground during walking (example is given in Figure 2). Walkway system provides the spatial and temporal pattern of the contact between the foot and the ground, and furthermore the information about the characteristics, level of gait stability and quality of gait, and consequently significantly improves clinical monitoring of disturbed gait pattern in movement disorders (Menz et al., 2004; Webster et al., 2005).

Figure 3 presents how gait data are collected while subject walking on the plain surface using electronic walkway system. It is possible to use different walking protocols (for example going through the door or through narrow corridors) for testing gait performance, dependant on the given tasks and instructions how to perform gait.

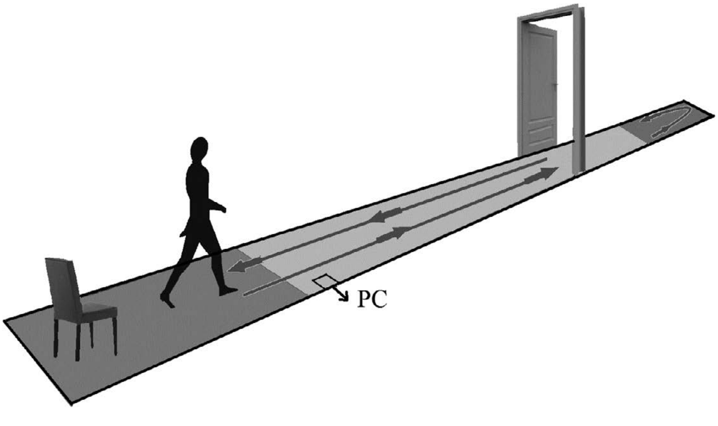


Figure 3 Pathway during performance of the walking tasks. Lighter zone of the pathway presents the electronic carpet where footprints are being recorded

Clinical gait analysis is central to the evaluation of medical and therapy outcomes in people with neurological conditions. Consideration is given to the pathogenesis of gait disorders and to the way in which their clinical presentation varies according to constraints afforded by the environment, task, attention, age, medication, and rehabilitation therapies. Gait analysis provides a useful assessment tool that is becoming a more widely accepted component of the clinical management of those conditions. Clinical management requires the identification of movement abnormalities and their causes. Once this has been performed, the appropriate management options can be considered.

Gait analysis and gait classification based on method of data recorded with inertial sensors

Another important and specific signal analysis method provides a set of quantitative differences of the pattern of gait compared to normal. The basis for this approach is a method for analysis of walking as a synergistic modulation of the rhythmic behavior coming from the pattern generators that signals from the higher center distributes as commands to the periphery. When particular and complex analysis is applied to data that came from the sensor units used for recording of leg segments (thigh, shank, and foot), obtained data are reduced to components that classify abnormalities based on differences between the two recorded gait patterns. The method reduces gait to a sequence of synergies with strongly expressed temporal and spatial components (Djurić-Jovicić et al., 2014).

If gait pattern is modified, gait will be represented with distorted shapes whose distortion level is correlated with severity of gait disturbance. Also, different mutual positions of correlation coefficients may indicate joints that provoke a disturbed control and directly affect gait quality. The descriptors of the behavior will be a major indicator for the comparison with normal gait. These numerical indicators could then be used by clinicians (like in other medical systems with automatic diagnostics) along with the interpretation what should be changed in therapy or treatment (e.g. which joint has the most impaired movement with the numerical quantification of the impairment).

Comparison of gait pattern characteristics during dual tasking

Gait is not an automated motor activity and it is not series of repetitions with each step exactly like the last because the everyday environment is constantly variable – even in healthy adults the strides fluctuate (Springer et al., 2006; Yogev et al., 2005). Studies in healthy subjects describe the impact of executive functions of the brain and attention impairment on gait performance. This impact shows great variability during executive functioning in complex gait situations, such as dual-task performance while walking. Dual tasking paradigm relies upon executive function and the ability to divide attention during different tasks during gait, i.e., while subjects perform given motor or mental tasks while walking. Influence has been tested in otherwise healthy older adults as well as in patients diagnosed with different neurodegenerative disorders, mainly with Parkinson's disease, patients with dementia or depression, Alzheimer's disease or some other diseases (Radovanović et al., 2014a; b).

Many recent studies further focus importance of cognition in gait coordination, postulating that it is far from being automatic function. This is supported by the observation that performing attention-demanding dual-tasks while walking can affect gait parameters. Particular attention has been drawn to increased gait variability occurring in dual task condition, since it seems to be correlated to increased risk of falls.

The capacity for "dual task", to perform more than one task at the same time is conceptualized as the ability to complete a "primary" task, which is the major focus of attention and action, and a "secondary" or "distracter" task at the same time (i.e. Abernethy, 1988). Simultaneous performance of two demanding tasks causes competition for attention and challenges the brain to prioritize the tasks. It has been reported that healthy adults give priority to the stability of gait when walking and performing a cognitive task (Bloem et al, 2001). Also, it has been shown in young subjects that when asked to prioritize gait, gait speed increased, while gait speed decreased and gait variability increased when asked to prioritize the cognitive task (Yogev-Seligmann et al, 2010).

Protocols for dual task gait testing are different. However, most of them explore the cognitive and motor effects on gait to assess cognitive-motor interference while walking (for example, Al-Yahya et al., 2011). Gait performance was measured with and without performing concurrent cognitive and motor tasks. Subjects performed a basic, simple walking task, a dual-motor task, a dual-mental task, or combined motor and mental task. During preferred, comfortable usual walking speed, motor dual task comprises of walking with the glass fully filled with water, or some other adequate motor protocol, with the aim not to spill the water, allowing using one or both hands, if necessary. Mental dual task was serial "7" subtraction (100-7=?, then -7 is equal ?, and so on…), while combined motor-mental task was given to subject to perform serial subtractions while walking with the glass of water.

Dual-task difficulties have a strong impact on daily life activities and everyday tasks that often require the ability to perform two actions concurrently. The understanding of how the dual task paradigm affects walking parameters in a specific pathology is crucial in the planning and assessment of rehabilitation, and in monitoring the degenerative process progress. A population-specific reliability analysis of gait parameters during dual task paradigms is essential to discriminate a real deterioration or improvement in the gait performance from a normal variability between consecutive measures of different subject or patients groups. For example, it has been described that gait parameters demonstrated to be reliable during dual-task in not only in healthy older adults but also in subjects with dementia (Montero-Odasso et al., 2009; Hollman et al., 2010).

Gait analisys in neurodegenerative disorders – impact on gait pattern characteristics

Comparing parameters of gait and extracted data in neurodegenerative disorders and diseases – Parkinson's disease, with or without present dementia or depression, Alzheimer's disease or other diseases (Radovanović et al., 2014a; b) could help to separate different forms of disorders and provide follow-up during disease progression and its impact on gait function. Gait characterization could help to further minimize gait disturbances and negative effect on gait changes during disease progression. Differences in the pattern relatively specific for the disease could point to postural instability and warn for possible falls in complex walking situations.

Gait analysis in neurodegenerative disorders and gait pattern changes could point toward underlying causes of present disturbances and helps in adequate choice of therapy approaches and medication or rehabilitation procedures and therefore improve therapeutic effects.

Gait disturbances, presented through reduced gait velocity, shortened stride length, longer single or double support are integral parts of clinical manifestations of neurodegenerative diseases, such as Parkinson's disease, and most disabling symptoms for patients quality of life. Further, patients exhibit problems with gait initiation, maintaining symmetry and rhythmicity of the gait, turning, and they also suffer from motor blocks i.e., freezing episodes during gait. All these issues contribute to higher risk of falling during walking. Analysis of gait pattern could point toward underlying causes of present disturbances and helps in adequate choice of therapy approaches and effects.

Studies were constructed to compare parameters of gait in several neurodegenerative disorders and diseases – Parkinson's disease, with or without present dementia, Alzheimer's disease, Huntington chorea and Progressive Supranuclear Palsy, Amyotrophic lateral sclerosis, multiple sclerosis, etc. Measurement of spatiotemporal gait characteristics usually were performed on the electronic sensor walkway system and calculate parameters such as gait velocity, cadence, step and stride length, single and double limb support, swing time, gait cycle and variability of all those parameters.

Comparison of data extracted and analyzed could help to separate different forms of disorders and provide follow-up during disease progression and its impact on gait function. Gait characterization could help to further minimize gait disturbances and negative effect on gait performance during disease progression.

Comparison of gait pattern characteristics during dual tasking walking in Parkinson's disease patients

Locomotor and gait disturbances are most prominent features of Parkinson's disease (PD) and are one of the major determinants of activity limitation in people with this disabling neurological condition (Morris et al., 1994; 1998). The aim of clinical gait analysis in PD is to determine whether the patient has hypokinesia, ignition disturbance, freezing, or dyskinesia, as well as to a scertain the relative contribution of these movement disorders to gait disability at different phases of the anti-parkinsonian medication cycle. The severity of gait disorders in PD also varies according to disease duration, the environmental context in which walking occurs, the type of locomotor task being performed, the presence of external cues, and the extent to which the person uses attentional strategies to bypass the defective basal ganglia in order to regulate the walking pattern. Gait hypokinesia is by far the most common gait deviation in PD.

PD is not just a motor disorder. Although it is associated with motor dysfunctions, such as bradykinesia, tremor and rigidity, almost 90% of all PD patients experience non-motor manifestations during the course of the disease (e.g. Shulman et al., 2001), such as neuropsychiatric symptoms- depression, apathy, hallucinations, then autonomic dysfunctions, sensory problems, pain and sleep disturbances.

Many recent studies focus importance of cognition in gait coordination, postulating that it is far from being mere automatic function. This is supported by the observation that performing attention-demanding dual-tasks while walking can affect gait parameters (Ble et al., 2005; Springer et al., 2006; Yogev et al., 2005). Particular attention has been drawn to increased gait variability occurring in dual task condition, since it seems to be correlated to increased risk of falls. Dual tasking paradigm relies upon executive function and the ability to divide attention. It has been tested in otherwise healthy older adults as well as in patients diagnosed with different neurodegenerative disorders, mainly in Parkinson's disease (PD). On the other hand, depression is one of the major non-motor symptoms of the PD, and it has been shown that depressed patients score worse on executive function tests. Comparison of gait patterns in depressed and non-depressed PD patients in dual-task conditions and correlation to cognitive tests results shows that stride time was significantly longer and stride time variabillity was significantly larger in depressed PD patients in repeated measures accross different dual task conditions (Yogev et al., 2005; Schaafsma et al., 2003). Furthermore, depressed patients had significantly longer double-support time and shorter swing-time when expressed as a percentage of the cycle time.

Little is known about the gait characteristics in patients with PD in its early stage. Few studies explored gait pattern in untreated patients in the initial stages of unilateral PD during the self-paced walking (Baltadjieva et al., 2006; Grajić et al., 2015). Motor symptoms in PD are typically asymmetrical. Early stage of PD is characterized with a predominantly unilateral appearance of tremor, rigidity and bradykinesia. However, study found that although gait was already altered in PD patients in its early phase, gait symmetry remained preserved (Grajić et al., 2015).

The impact of functional electrical stimulation (FES) on freezing of gait (FOG) in patients with Parkinson's disease

One of the symptoms of Parkinson's disease is impairment of gait pattern characterized by weaker motor control, slower gait, decreased stride length, increased cadence and duration of double support phase. Patients exhibit problems with gait initiation, maintaining rhythmicity of the gait, turning, and they may suffer from motor blocks, phenomenon known as freezing of gait (FOG). All these issues contribute to higher risk of stumbling and falling in patients and consecutive injuries.

Recently, several studies tested the influence of functional electrical stimulation (FES) as one of the possible therapeutical approach on disturbed gait in patients with Parkinson's disease with history of freezing episodes (i.e. Djurić-Jovičić et al., 2014). Patients gait was recorded while walking along the given path comprising standing up from the chair, passing through doorway, walking along hallway, turning 180 deg and returning back to the chair (Popović et al., 2010). Besides regular walking, protocol also comprised walking while carrying tray with glass of water (dual-tasking). In that protocol patients' peroneal nerve of the leg which was estimated to be from the weaker side was stimulated during the swing phase in moments when gait "normal" pattern was impaired. Stimulation was triggered automatically based on heel switch placed in the shoe. Gait sequences with and without FES recorded successively could be estimated, and these gait patterns were compared afterwards as an effect on gait pattern.

Preliminary results showing that FES could decrease variability of stride duration and stride length and also could diminish duration of double support phase in some patients (described in Djurić-Jovičić et al., 2014). It has been reported that while stimulated some of the patients in recent studies did not experience motor blocks in a few places along the path where they otherwise had problems with FOG.

Dual task effects on gait characteristics in patients with Progressive supranuclear palsy

Alterations during gait and gait performance characteristics are clinically observable phenomena in also in movement disorders patients suffering from progressive supranuclear palsy (PSP). PSP, with rapidly progressive postural instability and slow, unsteady gait, vertical gaze palsy, parkinsonism unresponsive to levodopa, pseudobulbar palsy may be difficult to differentiate from Parkinson's disease in its early stages. Further, gait analysis of two mayor clinical types of PSP, Steele-Richardson-Olszewski syndrome (RD) and PSP Parkinsonisms or PD-like form (PSP-P) may help to differentiate and improve accuracy of early diagnosis, and exclude and differentiate PSP types from related disorders (Burn and Lees 2002; Litvan et al., 2003).

Some recent studies compared gait patterns in PSP patients during demanding dual-tasking (DT) while walking (Lindemann et al., 2010). Patients performed simple walking task, dual-motor task, dual-mental task, and combined motor-mental task. Measurement of spatiotemporal gait characteristics was performed on the GAITRite electronic walkway system. Calculated parameters were gait velocity, cadence, step and stride length, single and double limb support, swing time, gait cycle and variability of those parameters. Results show that dual-task paradigm while walking differently affect gait pattern in PSP patients. Dual-task shows differences in gait speed, stride time variability, double support time variability as well as swing time variability between RD type and PSP-P type patients. It has been shown that variability of these parameters increases with more demanding parallel tasks. Those changes, if prominent, associated with unstable gait during demanding dual tasking may help to differentiate PSP subtypes, as well as PSP from related disorders.

Gait pattern in Amyotrophic lateral sclerosis

Amyotrophic lateral sclerosis (ALS) is a progressive neurodegenerative disorder involving cerebral cortex, brainstem and spinal cord, affecting upper and lower motor neurons. It is characterized by progressive weakness, fatigue, loss of balance and coordination of muscles used in motor control (Rowland and Shneider 2001; Lui and Byl, 2009). Loss of motor neurons could affect motor control in ALS, and it has been shown that gait and variability of gait parameters become altered (Hausdorff et al., 2000; Goldfarb and Simon, 1984). However, ALS impact on motor control and gait characteristics requires further investigations.

Concerning gait in ALS, at the onset of the disease, the motor neurons begin to deteriorate, affecting the strides from one gait cycle to the next cycle. Few studies analyzed variability of gait, showing that cycle time is longer in ALS compared to controls (Wu and Shi, 2011), and that coefficient of variation also varies in ALS more than twice then in healthy subjects (Hausdorff et al., 2000). Gait patterns were also compared in ALS forms with spinal and bulbar onset while performing demanding dual mental and motor tasks. Differences were assessed by measuring the gait parameters such as stride time, swing or double support time and stride length, and it has been shown that their fluctuations in stride and swing intervals could help to discriminate healthy subjects and ALS patients early in the disease course, and further help to differentiate the disease forms under various walking conditions (Radovanović et al., 2014b).

Gait pattern differences between different forms of multiple sclerosis

Multiple sclerosis (MS) is one of a most frequent neurological disease - chronic inflammatory demyelinating and neurodegenerative disease of the central nervous system causing permanent disability. People with MS have neuromuscular deficits such as ataxia, early muscle fatigue, spasticity and sensory disturbances, which limit gait and considerably affect their everyday living activities (Givon et al., 2009; Cameron and Wagner, 2011; Monticonea et al., 2014). Walking alterations can be detected at an early stage of the disease as patients walk more slowly, with shorter steps, and spend a larger percentage of the gait cycle in double feet support (Sosnoff et al., 2012). Although the walking deficits of subjects with MS have traditionally been attributed to neurological impairments of the locomotor system, there is growing evidence that cognition may play an important role (Sosnoff et al., 2011). Indeed, simultaneously performing cognitive tasks decreases walking ability (Hamilton et al, 2010; Kalron et al, 2010). MS can cause different patterns of motor disturbances and gait pattern changes and consecutive difficulties in all its main clinical phenotypes: relapsing-remitting (RRMS), secondary- progressive (SPMS) or primary- progressive MS (PPMS).

The gait patterns of the patients with MS were more variable than those of the normal healthy controls. The assessment of quantitative gait parameters in healthy subjects and people with MS is highly reliable under both of the investigated dual tasking conditions. If gait pattern and gait characteristics during dual task paradigm performance (motor or mental task performance during gait) are compared in MS patients with RRMS and PPMS, it was noted that tasks performed during gait in MS are affecting gait parameters differently. Cycle time is longer and stride length is shorter in RR compared to PP form, while motor and mental dual tasks are affecting gait parameters of both MS forms in similar manner, increasing their coefficients of variation. It is speculated hanges in gait parameters and characteristics in RRMS and PPMS forms might be the consequences of different internal and external interactions (Monticonea et al., 2014). Those differences could help to design and separate treatment approach and strategies for different MS forms.

The significance of detailed gait analysis for neurorehabilitation

A central nervous system lesions (such in stroke, spinal cord injury, MS, cerebral palsy, etc) often result with gait impairment. The process of recovery can be improved by effective treatment (e.g., intensive training of gait or movement performance). The level of gait recovery is then assessed by scoring the disability and impairment (e.g. Berg's balance test, Fugl-Meyer test, etc), and by analyzing the gait speed, cadence, stride length and gait cycle duration, symmetry, etc. Analysis of gait then provide elements for better understanding of the plasticity at the spinal and supraspinal levels and therefore, allow the selection of the treatment that is optimal for the specificity of CNS lesion and its recovery. The knowledge about kinematics and results of analysis provides real data about the function regained, which is of the highest interest for the patient. For example, it is long known that the patients with similar clinical scores, and even similar basic gait parameters have significantly different muscles function recovery level if they are in the acute or chronic post stroke phase (e.g. Hausdorff and Alexander, 2005).

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Theme 4

Social Inclusion and Quality of Life in Persons with Disabilities

COMPENSATION AND OVERCOMPENSATION IN THEORY OF SPECIAL EDUCATION AND REHABILITATION

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SUMMARY

Compensation and overcompensation at children with disabilities is the topic that Vygotsky studied already at the beginning of last century. His observations he used to compare with observation that Adler made on the same topic. Both researchers found that mechanisms of compensation and overcompensation at children with disabilities are based on disharmony between personal imperfection and requests from their social surrounding. Children with visual impairment or hearing impairment, as well as people with motor impairments, always use mechanisms of compensation when they find themselves in situation that social surrounding has certain requests from them but their personal potentials are below these requests. Nevertheless, compensation is not always possible, and especially overcompensation is not always possible. The levels of compensation are different and dependant on the rest of capacities that certain person could activate as compensational. We believe that it is necessary to reactivate this topic in science and to interpret agitators and patterns of compensator mechanisms development in children with visual and hearing impairments and people with motor impairments. Rehabilitation and education of children with disabilities is not possible without knowing compensator mechanisms. Compensation is not always beneficiary and in certain situations compensation could establish psychopatological features.

Key words: compensation, overcompensation, children with disabilities, special education and rehabilitation

INTRODUCTION

In theory of special education and rehabilitation compensation and overcompensation are not central topics. One could say that this is because compensation and overcompensation are well known and accepted for long time. Compensation is psychological process that generate from disharmony between personal imperfections and requests from social surrounding. This disharmony could be consequence of congenital visual, hearing or motor impairments, as well as consequence of physical impairments, lesions or chronic diseases. In psychology, compensation is also called behavioural adaptation whose aim is to "give back certain imperfection or loss of personal feature" (English & English, 1958, p. 101). In this way compensation could be viewed as adaptation, overcoming of deficit and improvement of psychological functioning.

It is known from earlier practice that children with disabilities and invalid adult people show capability of compensation. Vygotsky (1996) was one of the first scholars that point to phenomenon of compensation in children with disabilities. At the same time Adler (1959, 1984, 2007) also made his observations about compensations and overcompensations that are result of diseases, physical lacking and weakness. Both of them pointed that misbalance between personal imperfections and requirements of social surroundings starts compensatory mechanisms.

We assume that that this topic should be reconsidered once again through analysis of observations and conclusions that these authors made.

1. Adler about compensation and overcompensation

When Alfred Adler, Viennese psychiatrist together with eight of his followers and colleges left Freud's "meeting on Wednesday", that was attended by first followers of Psychoanalysis, one Wednesday in spring 1911, that was the time when Second Viennese School of Psychotherapy called Individual Psychology was born (the first one is Sigmund Freud's Psychoanalysis, and the third one is Viktor Frankl's Logotherapy).

Individual Psychology, as Adler called his theory, was founded on several postulates as inferiority complex, will to power, compensation etc. Soon, these terms became words used in daily conversation and non-professionals were using them in discussions, because they could anticipate their meaning (Adler, 1984).

The basic postulates of Adler's theory have their roots in his personal life experience. He was born in 1870 at the periphery of city of Vienne, in poor neighbourhood. From his early life he had to fight and struggle with difficulties. His childhood was labelled with several diseases like pneumonia and rickets, which kept him from walking until he was four years old. His physical constitution was weak, and he was short sighted. At that point, he decided to be a physician. Based on his personal early life experience Adler grounded keystones of his teaching about inferiority of physical body organs and surpassing them through compensation. He became best pupil in class, improved his physical strength, developed self-esteem, and neutralized feeling of inferiority that he had because of short high and social status (Sperber, 1972).

Adler began his medical career as an ophthalmologist, but soon switched to general practice, and established his office in a less affluent part of Vienna. His patients were mainly people from working class, and influenced him to start investigating social dimension of medicine. Later, that was the reason he joined socialist movement.

When Freud started to teach among his colleagues a new theory that he called "psychoanalysis" in year 1900, Adler joined him and became vigorous. He was active follower of Freud until they split in year 1911.

Actually, Adler was quite angry when someone would call him "Freud's follower". He considered himself as equal to his teacher. Often Adler would say that they "just temporally marched under the flag of psychoanalysis".

First meetings of Freud's study group did not show any signs, by remarks of members, that they have any wish to walk their independent way. Freud, which was without any doubt authority, made the boundaries between his followers was free to move. They had to accept keystones of theory of psychoanalysis. These were concepts of libido, unconscious child's sexuality, and repression. Anyone that would jump out of this limited psychoanalytical domain was later punished by expulsion from the group.

Until year 1907, Adler did not show any sign of his independence. That was the year when he published his work titled "Study of Organ Inferiority and Its Psychical Compensation" in which one could assume his future path to independence. In next four years until his break, Adler formulated basic foundations of his teaching: about organ inferiority, about will to power that is expressed through compensation and overcompensation. In his later work he was discussing the meaning of life, life style, life tasks and social embeddedness (Bounouls, 1982).

The main reason to break with founder of psychoanalysis was concept of "will to power". Adler believed that centre of human psychology is not sexual instinct, but rather will to power. He assumed that sexual instinct is in service of will to power.

According to Adler, will to power is product of feeling of inferiority, that comes with birth. The child is the most helplessness mammal without any chance to survive without help of their parents or their substitution. Some pediatric psychiatrists believe that only children older than 10-12 years are capable to care about themselves. Helpless child that is absolutely dependent on parents develops complex of inferiority. The child understands that left alone does not have any chance to survive without food and protection (Adler, 2007). This especially concerns tribal society in which child learn from his early life point to survive in unpleasant surrounding. The act of initiation, in this community, define his maturity or capability to take care about himself.

In order to overcome long standing state of helplessness, the child develop strong motif – will to power. In formation of this basic concepts Adler used his medical professional and specially his life experience. He started life as rachitic and weak child, and bad student in school, but later became well developed young man and one of the best students in class. What he concluded from medical practice is that when one out of pair of organs is out of function (ie kidney, lung etc) than the other which is healthy overtakes the function in whole organism.

Motif that leads the child and later young person and adult, is pretension to neutralize that basic feeling of weakness. The weakness is product of not only physical, but also psychological and social milieu.

Freud once said that upbringing of a child is the most difficult task. Inadequate procedures of parents like scolding, disregards, humiliations, insults and physical punishments, leave trace in child's mind. Marks of these procedures are deep traced in immature brain and nerve system and acts through the rest of someone's life. Psychological trauma that occurred in early childhood is hard to neutralize. This trauma is ground stone for psychological feeling of inferiority. It is almost as some interior organ that is telling to a child "you are worthless, you mean nothing" (Adler, 2007). Feeling of inferiority that is based on insults could be source from which strong compensation force will develop as a wish for neutralization.

Together with two previously discussed types of inferiority socialization could synergistically influence formation of special life style. Feeling of social marginalization, rejection from community because of low social status, difference in race or ethnicity, belonging to socially discriminated groups makes strong experience of humiliation. This could lead to formation of grounding for later radical movements against inborn status. Certain number of revolutionists, rebels and terrorists is recruited from this kind of milieu.

Social degradation is strong motor that moves some person that through compensation and overcompensation aims to social success, at first to lucrative goods and later to political power. Many biographers of state, political and military leaders, especially in last two centuries, point to the fact that some of these leaders experienced status of social degradation. Some of these people were from the margins of society, some from non-functional families (divorce, violence), or some of them were orphans.

Social degradation in these persons is usually followed by some physical body limitation like short height, body lesion etc that attracts attention and response of aggression, usually from class mates. Their insults might be that much strong that in some cases they lead to a suicide. In this way physical inferiority of certain organ leads to psychological feeling of inferiority. This person is subject of insult, laugh, verbal attacks (that are sometimes followed by physical attack) and it ends with social degradation. As a consequence of these three causes isolation, verbal boycott, and social ostracism develop. For Adler this feeling is at the end consequence of social isolation. The individual does not suffer much because of physical imperfection, as much for social marginalization.

1.1. Compensation and overcompensation – structural approach

Inferiority that is present on physical, psychological or social level, or all three levels together, is hard to tolerate and provoke strong call for its cancellation. The individual starts strong battle with phenomenon of inferiority. He/she put the whole psychological apparatus in the service of compensation. All around us are persons that aspire to certain life aims, usually they collect material goods or they have aspiration to political power, in order to neutralize early childhood traumas. They try to neutralize feeling of lacking something like money or love. However, compensation itself may lead to social success and intimate satisfaction, if it is moderate and if life expectances are realistic.

There are many people that surpassed their physical defect and succeed in the field that was related to their imperfection. Some of the best examples are Demosthenes and Helen Keller.

Sometimes it is quite difficult to draw the line between normal compensation and pathological compensation. (Adler, 1959). One approach might be in following. If someone makes realistic and rational effort to overcome imperfection, than we could define this as normal compensation. On the other hand if someone subordinates all efforts only in that direction, it is according to Adler definition overcompensation.

Sometimes aspiration for neutralization of imperfections became life style. Everything might be subordinated to this aim: professional career, marriage, upbringing and education of children. This aspiration for importance and power overcome all aims, and this type of hypercompensation has neurotic character (Bounouls, 1982). So according to Adler, neurosis is constant battle for fictive life style; similar to filling of Danaid barrels that according to Greek mythology are fathomless.

Individuals with hypercompensation are narcissoid, egocentrics and very offensive. They express quite often aggression toward society, they are occupied with themselves and wit their own importance. Also, they try to dominate and they have superior attitude. During the conversation they are exclusive, but also very breakable if their opinion is not accepted (Slavik & Carlson, 2006). Their life aim is quite obvious; they aspire all the time to dominate and to be above the rest. If they have the opportunity they will collect needless stuff, to use them to neutralize basic insecurity.

With this kind of description of neurotic personality, Adler introduces social dimension (individual psychology). He is predecessor and founder of new direction in psychology that is named Neo-Freudianism. Neo-Freudians are also Erich Fromm, Karen Horney, Carl Jung and others (Erić, 2008).

1.2. Community feeling– social aspect

From his adolescence period Adler was acceptable for socialist ideas. When he married with Raissa Tomofejeva who was politically active in Russian Social-Democratic Party, Adler increased interest for ideas of socialism. That is one of the reasons he was better accepted than Freud among left wing psychologists.

Adler was among first psychiatrists at the beginning of 20th century that pointed to social nature of neurotic conflict, which occurs not that much on intra but more on inter psychological level. Community feeling, helping others, generosity instead of egocentrism are boundaries that separates neurotic human from healthy person.

Community feeling, feeling for living with other people but not against them is what characterize average person. That is in confrontation with egocentric life aim that characterize neurotic person. The former aspire towards community, the later is neurotic and self-interested with own problems. Neurotic person is trying that through hypercompensation neutralize own feeling of lacking and inferiority that acquired in early childhood (Dixon & Backman, 1995).

Feeling of community starts early in family life. That is family which raises children to form warm relations between themselves, and later in their lives it will be manifested as a strong feeling for others. On the other hand, parents that raises children in cold surrounding that is often permeated with punishment and disregard create persons which will aim to power to eliminate feeling of infantile inferiority by any price.

2. Vygotsky about compensation

In order to better understand the work of famous Russian-Soviet psychologist Lev Vygotsky (1896-1934), social background of the time when his first capital book entitled “ The Fundamental Problems of Defectology “ should be enlighten. It was the year 1929 in new borne state of Soviet Union (Vigotski, 1996). The state was born through bloody civil war and communist revolution (1917-1920) which strongly affected ideology that was present in social sciences, but also in natural sciences.

Turnover in Soviet psychology also occurred. Before the revolution Freud had many followers in Russia (Wolf, Osipov, Sabina Spielrein), but new authorities criticized him as bourgeois psychologist. Freud was criticized that he founded his work on patients of Viennese middle and upper social class, but he never study social dimension of psychoanalysis. He was also criticized for concerning of neurotic conflict as intra psychological, something that occurs only in personality, and that he did not care about inter psychological relations as confrontation between personality and society. Also, Freud was criticized for introducing biological determinism instead of social dimension. He claimed that faith of individual and neurosis are determined from biological background (Rieber & Carton, 1987).

After revolution new Soviet authorities stabilized state apparatus and state institutions as administration, police army, and turned to ideologization of whole society. They started aggressive action towards all "retrograde and bourgeois teachers", especially in the field of philosophy, sociology and psychology. For the first ten years after the revolution these changes did not concerned the field of psychoanalysis. Vigotsky published "The Fundamental Problems of Defectology" at the time when repressive state policy started to influence psychology. That is why his view about Adler's theory of inferior organs and compensation should be considered from this perspective. On the other hand, Soviet psychology accepted from Western psychology and pedagogy some of the Adler's work. Vygotsky also had much more positive opinion on Adler comparing to Freud.

Vygotsky finds in Adler's work as a positive dialectic view. Vygotsky believe that inferiority or defect could be compensated to a new quality through dialectic. That is also a keystone of dialectic materialism (Rieber & Carton, 1987).

As Vygotsy says "Adler think in dialectic manner: development of individual is initiated by contradiction, defect, maladjustment, inferiority – and that is not only negative, imperfection, negativity, but also a stimulus for overcompensation. Adler makes basic psychological theory about dialectic transformation of organic inferiority through subjective feeling of inferiority to psychological aspiration towards compensation and overcompensation".

Vygotsky points to teleological character of Adler's teaching quoting that "we are not able to think, feel, act, if there is no certain aim…". He also present that "Adler name defect as a initiating force of development through compensation and as a final aim of life plan…line defect-overcompensation is also leading line of child's development in which some function is damaged or organ…defect alone is not psychological poverty, but also and source of power…"

Vygotsky finds Adler's work progressive because of social dimension, relation between neurotic individual and fro him threatening bourgeois society. Vygotsky also believe that Adler's teaching about genesis of neurotic defect must be discussed in much wider context: what is impact of whole society on development of defect? He shows that defect obtain full pathogenic power on mind after society accept that defect, and later through feedback that defect hits the child with physical body or mind defect (Rieber & Carton, 1987).

3. Criticism

Starting from 1930's work of Sigmund Freud was ideologically criticized in Soviet Union and labelled as "retrograde bourgeois teaching of Sigmund Freud". Scientific research of Ivan Pavlov about conditioning reflex became obligate and general explanation for all psychological processes. Therefore, even Adler rejected psychoanalytical view his work was also criticized (Etkind, 1999).

The biggest disagreements between Soviet defectology and Adler were in the view of compensation and overcompensation. Adler believed that compensation is fashion that individual use to surpass his inferiority and to drive own psychological life to the status of normal.

Overcompensation is according to Adler, overthrow of aim, constant fight for fictive life aim, to which the whole personality is subordinate.

Individual psychology concerns overcompensation as pathological and find it at the background of neurosis and as well as psychosis. An individual overcompensates own feeling of inferiority with constant effort towards trauma that was obtained during childhood in order to neutralize that trauma. If that individual overthrow the aim, than that person gradually form the personality whose main life aim is to prove own qualities to itself and to the others. This way an egocentric and cynic person is formed. That person always wants to enlarge material goods. I that way "The Neurotic Personality of our Time" is formed as Karen Horney named her work (Hornaj, 1991).

Vygotsky believed that overcompensation as normal phenomenon is final act of process of compensation, and that process is not pathological. He supposed that overcompensation is onlu final point of one or two possible outcomes, one out of two poles of development that is influenced with defect. The other pole is unsuccessful compensation, running into disease, absolute psychological asociality. Unsuccessful compensation transforms itself through disease into defence, fictive aim that turns the life plan to wrong direction.

The terms compensation and overcompensations are seen in different ways. According to Adler overcompensation is pathological defence from inferiority, while Vygotsky consider overcompensation as higher form of successful compensation.

4. Remarks

We believe that this topic deserves to be further reconsidered, but not only from the point of meta analysis but also from the point of scientific research. The reason for this reconsideration comes from the fact that this topic is not present enough in research papers that consider children with disabilities in special education and rehabilitation. Process of learning in children with disabilities and their inclusion in social surrounding, request knowledge about mechanisms of compensation. This might be of special interest knowing that compensation is not always beneficiary for an individual, but could also have some psychopatological features.

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THE IMPACT OF PHYSICAL ACTIVITY ON QUALITY OF LIFE FOR SCHOOLCHILDREN WITH INTELLECTUAL DISABILITIES

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SUMMARY

Researches of quality of life in medicine are used everywhere, where the indicator of the quality of life is used to assess the effectiveness of treatment [8], and in pedagogy, particularly in special education, this method is used very rarely. The growth of interest in this issue is an indication of the desire to develop a holistic view of person as such. The analysis of the correlation of parameters of quality of life on the one hand, and indicators of physical efficiency, functional condition on the other hand, in the process of regular practice of physical activity in schoolchildren with intellectual disabilities becomes to relevant.

The work is done on the basis of special (correctional) schools No. 18 of the city of Ulyanovsk. The object of the research was 65 schoolchildren aged 8 to 18 years old.

The quality of life in schoolchildren with mental retardation, engaged in sports, is significantly higher than schoolchildren without regular physical activity.

Quality of life and physical activity among schoolchildren with intellectual disabilities are interrelated. One of the manifestation of this relationship is the dependence of physical and functional variables in the process of physical activity: regular physical exercise improves emotional condition, enhance life satisfaction, regular physical exercise adapt and socializing schoolchildren in society.

Key words: quality of life, health, physical efficiency, functional condition, physical activity, schoolchildren with intellectual disabilities

INTRODUCTION

The concept of quality of life – a definition, that is relatively new to the national educational, sport and medical practice in general.The definition of “quality of life” (QOL) accumulates the basic conditions of existence and development of person. At the same time the quality of life can not be reduced to the level of life, as the latter is manifested as one of many criteria of quality. One of the important components of quality of life is health of people [3].

The term “Quality of life” has its origin in the “UN development Programme”, in reports on human development, (it was developed in 1990) [17]. The WHO defines quality of life as a person’s perception of their position in life, including physical, mental and social wellbeing, independence, quality of the environment in that he lives, the degree of satisfaction of a particular standard of living and other components of psychological comfort [1]. There are various methods of estimation of life quality [10,16,18], and, consequently, different approaches in the study of subjective quality of life [8].

Publications about the quality of life of people with various disorders occur in the scientific literature increasingly From the point of view of medicine, quality of life is the ability of the patient to live as full a life as their healthy peers, in similar economic, climatic and political conditions [9,11,15]. And if in medicine there are researches in that the indicator of quality of life is used to assess the effectiveness of treatment [8], in pedagogy, and in particular in special education, adaptive physical education this method is applied very rarely. The growth of interest in this issue is an indicator of the intent to develop a holistic view of the person as such.

The use of the concept of "quality of life" usually refers to chronic diseases [12]. This area includes lesions of structures in the brain that occur with mental retardation. Exactly, the quality of life determines the success of socialization of schoolchildren with mental retardation, the prognosis of disease and encourages researchers to the development of new and improvement of existing methods. The use of modern technologies of adaptive physical culture and sports allow pursue a prophylaxis of concomitant diseases, to rehabilitate and, ultimately, to socialize children with mental retardation. Thanks to data, that was obtained in research on the quality of life of the population, indicators of physical component of quality of life are connected with parameters of somatic, emotional condition and health in general [4].

The issue of quality of life, relation of QOL with physical development, physical efficiency, functional condition, and the impact of regular physical activity on indices of health of schoolchildren with intellectual disabilities becomes relevant.

Thus, the purpose of research is analysis of the correlation of parameters of quality of life on the one hand, and indicators of physical efficiency, functional condition on the other hand, in the process of regular practice of physical activity in schoolchildren with intellectual disabilities.

Objectives of the research

- To study the quality of life among schoolchildren with intellectual disabilities, engaged in physical activity.
- To make the analysis of relationship the quality of life and the information, that describing the health and physical efficiency and functional condition among schoolchildren with intellectual disabilities engaged in physical activity.

To make a comparative analysis of life quality among schoolchildren with mental disabilities, engaged and not engaged in physical activity.

Organization of the research

The work is done on the basis of special (correctional) schools No. 18 of the city of Ulyanovsk. The object of the study was 65 students aged 8 to 18 years. The research did not include schoolchildren who have a severe functional impairment and signs of deviations in mental development, F-71, badly understanding of the national language.

The "Control" group includes schoolchildren from III group of health, in the absence of acute disease at the time of the research (n-32). The group "main + physical activity" (hereinafter "based + F") (n-33), includes the schoolchildren, engaged in physical activity on a specially designed program "Development of Adaptive sports in the Ulyanovsk region", in sports section of basketball and light athletics from 1 year old to 4 years old on the basis of special (correctional) school №18 city of Ulyanovsk. Characteristic of groups of children are presented in table 1.

Table 1 *Characteristic of groups of schoolchildren with intellectual disabilities*

Characteristic/ diagnosisF-70	Groups of children		
	The total number	The “Control” group	The group “main + physical activity”
(n) girls	21	11	10
(n) boys	44	21	23

METHODS OF RESEARCH

The following research methods were used to solve the set tasks: questionnaire – Euro Quality of Life, questionnaire. Calculated the index of functional changes in A. P. Berseneva (IPC), a classic test PWC_{170} with sample of step test, which is taken 2 times.

The results, obtained in the research were processed by mathematical methods of descriptive statistics and testing of hypothesis by the t-criterion of Styudent, variance analysis by Fisher’s criterion, rank correlation of Spearman.

To study the quality of life in schoolchildren with intellectual disabilities was used the questionnaire of the Euro quality of life (Euro Quality of Life, or EuroQol). This is widespread used multiaspect questionnaire, developed jointly by a group of researchers from the UK, the Netherlands, Norway, Finland and Sweden (1990) [13].

Approbate of test on the various contingents of patients has revealed a significant “ceiling effect”, this instrument allows to reveal, mainly changes in the functioning and therefore it is mostly suitable for patients with severe diseases (J. Brazier) [14]

This version of the test is a visual analogue scale for global assessment associated with health quality of life. The test is drawn scale (like thermometer) on that the best health condition that only can imagine the subject corresponds to the assessment of 100 and the worst corresponds to the assessment of 0 (by S. Walker and R. Rosser, 1993) [20]. The test is simple to use and it is important for schoolchildren with intellectual disabilities.

Today this test is the most well-known questionnaire for study of quality of life of people with diseases, it is not non-specific questionnaires [5].

The questionnaire includes several scales:

- The scale of health assesses the subjective perception.
- The scale of activity in everyday life, self-service.
- The scale of physical pain, which can cause restriction of normal activity.
- The scale of mental health reveals the degree of anxiety, peace of mind. The answers are encoded in the points from 0 to 100. Most scores correspond to higher levels of quality of life.

Pilot research

During the pilot test, in that pupils of special (correctional) school № 23 of the city of Ulyanovsk (n-25) participated, it was found that schoolchildren with mild mental retardation understand the meaning of all the questions and completing the questionnaire does not represent to them the difficulty.

The research of variables associated with quality of life of schoolchildren with intellectual disabilities, also included a survey, that included information on social parameters (gender, age, the presence of the habit of smoking and drinking alcohol, consist of eating).

THE RESULTS AND DISCUSSION

Figure 1 shows the results of test on the questionnaire Euro Quality of Life (see Fig. 1). The research showed that schoolchildren with intellectual disabilities to assess quality of life in the range of 65-75 points. We need to consider the fact that children with intellectual disabilities do not always adequately assess their quality of life, but all the same time, if research was properly prepared by the appropriate methods we can get a reliable result. The assessment of the QOL of schoolchildren with intellectual disabilities in our research coincide with the results presented in the scientific literature (children with disabilities with lesions of the Central nervous system assess the quality of life for 63 points, theinforaton was indistinguishable with our indicators) [7]. Schoolchildren with intellectual disabilities assess the quality of life as low, as and adolescents with disabilities 61±3.2 points (Mochalova E. K., 2005), and this information was significantly ($p \leq 0.001$) lower than in healthy peers vs. 80±2,5 points out of a possible 100 (Mochalova E. K., 2005) [7].

“Subjective perception of the schoolchildren to the features of their functioning, health and quality of life is a serious moment to reavel the features of their medical-biological and social adaptation” (Bacharova E. V., 2008).

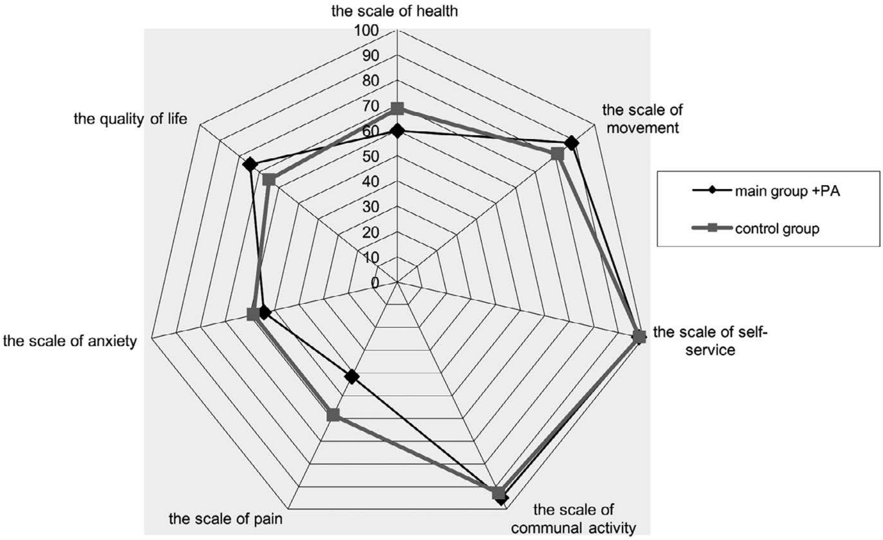

Figure 1 The results of test on the questionnaire Euro Quality of Life in schoolchildren with intellectual disabilities in the research group “control” and engaged in physical activity

In research groups quality of life has significant differences, depending on its integration and socialization in society. Physical activity, physical culture and sport as one of the aspects of socialization, play an important role in improving QOL of adolescents with intellectual disabilities and their integration into society. The result of the research of life quality in schoolchildren with intellectual disabilities revealed by paired t-criterion of Styudent dependent indicators of QOL was significantly higher (p ≤ 0,01) in the group engaged in physical activity. The indecator varies in the range of 74,7±1,9 points in the group engaged in physical activity, than this indicator in a control group, the result of which was QOL 64,9±2,7 points.

However, "the scale of health" the group, engaged in physical activity, assessed their subjective perception of health condition are lower than in a control group. The values of Fisher criterion in the group of athletes, the indicator is significantly lower (p ≤ 0,05) that at first glance is unexpectedly. We would expect that they should have the best subjective assessment of health because they engage in physical activity. We supposee that schoolchildren in this group more adequately assess their heaith condition. Through physical activity, a large number of the introduction of new and special physical exercises, that doesn't always work, increased motivation to achieve sporting success, is not always given the factor disease (such as mental retardation), do not allow schoolchildren to be satisfied their health condition.

Also "the scale of health" is clearly correlates to dependence on tobacco, and it indirectly confirms, that schoolchildren have not satisfaction with their health in the group engaged in physical activity. Half of the schoolchildren from group "main + PA" tried to smoke, and 30% of schoolchildren are smoking at the time of the research.

On the scales of "communal activity", "anxiety", "self-service" the results of identical and were indistinguishable in groups, the schoolchildren scored between 80 to 98 points.

However, on the scale of "physical pain" schoolchildren, engaged in physical activity, have the indicator, which is lower by the t-criterion of Styudent-dependent indicators (P ≤ 0,5), than in the "control" group, and in the questionnaire the schoolchildren engaged in physical activity in question – "Did you have a stomachache,a headache, teethache, etc.in the last week?" scored 0,33 points. In the "control" group of the same question schoolchildren responded by 0,71 points. This fact shows, on a less physical discomfort, diseases that can cause restriction in the normal functioning of schoolchildren, engaged in physical activity.

Despite a number of scales, that showed dissatisfaction with the health, quality of life in schoolchildren engaged in physical activity is significantly higher than schoolchildren, non-engaged in physical activity. Regular physical activity, physical exercise improves emotional condition of schoolchildren with intellectual disabilities and increase life satisfaction, and "having effective ways of overcoming difficulties, lack of depression and anxiety contribute to the formation of motivation for physical activity" [4].

The assessment of factors associated with quality of life of schoolchildren with intellectual disabilities, would be incomplete without the inclusion of indicators of functional health condition, and physical efficiency.

In assessing, in groups the index of functional changes in A. P. Berseneva (IPC), we defined a normal (satisfactory) adaptation: IPC main =1,91±0,2; IPC main+PA =1,97±0,09.The indicator reflects a good adaptation to the environment, individual health, about the high possibilities of the circulatory system schoolchildren with intellectual disabilities, and the potential of physical activity without restrictions. The index of functional changes is an indicator, determining the relationship between two opposing concepts: "health" and "disease" [6]. We can talk about functionally "healthy" schoolchildren on the index of IPC in the research groups.

Positive correlation relationship were established between quality of life and IPC in research groups and in the group "main +PA" ($p \leq 0,05$) correlation is more reliable. Thus, more adaptive functional condition of schoolchildren with intellectual disabilities corresponds to the high assessment of quality of life.

For determining the total physical efficiency (TPE) we used the classic test PWC$_{170}$ with sample of step test, that is taken 2 times step test had next criterions: (h – 0,35 m, the temp of the first load– 16-20 hearbeats per min., the second load – 30 hearbeats per min.), the coenfficent of inferior work (C) was 1,3 [6].Due to the significant lability of heart rate in schoolchildren with intellectual disabilities when the magnitude of the pulse after the first load was 150 hearbeats per min., and after the second load 160-165 hearbeats per min., we used the calculation formula for Abrosimova L. I., Karasik V. E.

The results of physical activity in the group "main +PA" PWC$_{170}$=18,6 ±1,3 kgm /min/kg and in a control group PWC$_{170}$=16,85 ± 1,06 kgm /min/kg were assessed as moderate. Figure 2 shows the indicators of PWC$_{170}$ in groups by ages, engaged in physical activity and not engaged (see Fig. 2).

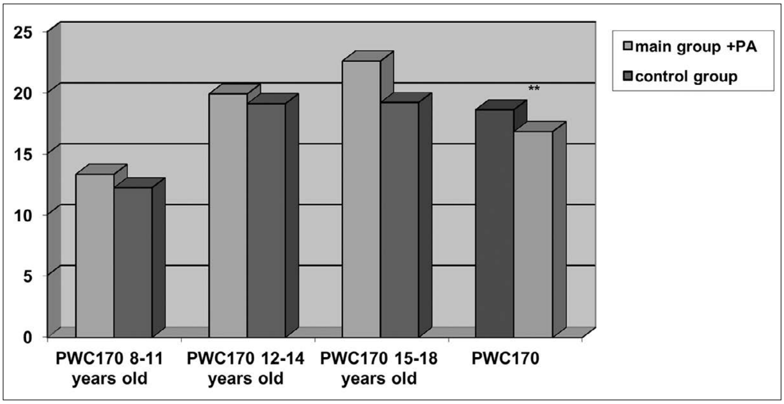

Figure 2 Indicator of PWC$_{170}$ in schoolchildren with intellectual disabilities in the groups of control and additionally, engaged in physical activity by age. (The last column is the average PWC$_{170}$ in the groups "control" and "main +PA")

When we did the individual assessment the test of PWC$_{170}$ of schoolchildren with intellectual disabilities aged 15-18,engaged in adaptive basketball from 2 to 4 years old, we fixed the highest indicator of PWC$_{170}$=22,6 ± 0,1 kgm / min / kg (see. Fig. 2) By paired t-criterion of Styudent, dependent indicators of PWC$_{170}$ it is significantly different in the groups, a control group has the result of the test of PWC$_{170}$ lower 95% ($p \leq 0,05$) than this idicator in groups, engaged in physical activity.

Positive correlation relationship were established between quality of life and PWC$_{170}$ in the group of schoolchildren, engaged in physical activity ($p \leq 0,05$).In a control group correlation between QOL and PWC$_{170}$ have a negative correlation. Thus, a good physical efficiency of schoolchildren with intellectual disabilities, engaged in physical activity, corresponds to higher scores of life satisfaction.

Quality of life and physical activity, physical education and sports for schoolchildren with intellectual disabilities are interrelated. The one manifestation of this relationship is the dependence of physical and functional variables in the process of physical activity: regular physical exercise improve emotional condition, increase life satisfaction, adapt schoolchildren through sports and socialize them in society.

CONCLUSIONS

1. The quality of life of schoolchildren with intellectual disabilities ranges from 65-75 points. The parameters that determine the level of quality of life, “communal activity”, “anixiety”, “self-service” in the group are identical and it does not indistinguishable, the results are in the range of 80-98 points. The indicators of QOL of schoolchildren with intellectual disabilities assessed as low, as teenagers – handicapped 61 ± 3,2 points.These indicators are significantly ($p \leq 0,01$) lower than in healthy peers.
2. The result of QOL are significantly higher ($p \leq 0,01$) in the group additionally engaged in physical activity QOL=74,7±1,9 points than the indicator in the main group – QOL 64,9±2,7 points.
3. On the “scale of heath”, the group additionally engaged in physical activity, assessed their perception of health condition lower ($p \leq 0,5$) than in a control group. It is assumed that schoolchildren, in this group, are more adequately assess their health condition,because they engage in physical activity. ”The scale of health” is correlated to dependence on tobacco, and it indirectly confirms, that schoolchildren have not satisfaction with their health in this group. Half of the schoolchildren from group “main + PA” tried to smoke, and 30% of schoolchildren are smoking at the time of the research.
4. On a scale of physical “pain” schoolchildren, engaged in phisical activity have the indicatot, that is lower ($p \leq 0,5$) than in the “main” group, this fact shows, on a less physical discomfort, diseases, that can cause restriction in the normal functioning of schoolchildren, engaged in physical activity, on a physical discomfort, which can cause a restriction in normal activity in schoolchildren with mental disabilities are additionally engaged in physical activity.
5. We can talk about functionally “healthy” schoolchildren on the index of IPC in the research groups. Positive correlation relationship were established between quality of life and IPC in research groups and in the group “main +PA” ($p \leq 0,05$) correlation is more reliable.Thus, more adaptive functional condition of schoolchildren with intellectual disabilities corresponds to the high assessment of quality of life.
6. In a control group PWC_{170}=16,85 ± 1,06 kgm /min/kg is moderate, in group “main +PA” PWC_{170}=18,6 ± 1,3 kgm /min/kg is good. PWC_{170} in a control group is lower ($p \leq 0,05$) than this indicator in the group, additionally, engaged in physical activity. Positive correlation relationship were established between

QOL and PWC_{170} in the group, engaged in physical activity($p \leq 0{,}05$), thus, a good physical efficiency of schoolchildren,engaged in physical activity corresponds to higher scores of life satisfaction.

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SYSTEM SUPPORT FOR FAMILIES OF CHILDREN WITH DISABILITIES WITH EMPHASIS ON FAMILIES OF DEAF CHILDREN

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SUMMARY

Birth of a child represents a change in family structure, a change that requires an adoption of new roles, as it brings new incentives to family dynamics. Birth of a child with disabilities, in fact a comprehension that a child has developmental disabilities, represents a stressor of different quality, placing a heavy burden on the family for a long period of time. As in other, different stress situations, pain and suffering, brought by the knowledge of child's disability, could present a trigger for the occurrence of different reactions and feelings on different levels. Shock, non-recognition of a disability, ambivalence, resentment, discouragement, chronic tension, feelings of guilt, feelings of isolation, defeat, depression, feeling of helplessness, blaming others, loss of self-esteem are just some of the possible reactions. In addition, parents are faced with an ongoing insecurity and greater anxiety in raising their child. Parents are being rewarded less by their children's achievements than parents of healthy children, there is a decline in their expectations. Also, fear of labelling the family as "different" may appear, as well as problems with the acceptance of moving a child to a special category. Finally, lack of criteria for predicting the future of the child presents a particular source of suffering.

Establishing good cooperation with the family, in order to establish a system of family support, requires many individual contacts, knowledge of its functioning, a lot of time and patience, as well as linking with experts in various fields. Early intervention is an integral part of the system of support for families of children with disabilities. We started from the fact that in helping children it is important to work not only with the child, but also with parents and that every form of work with parents is good, if it contributes to the child's general development.

Support for families of deaf and hard of hearing children begins soon after the baby is diagnosed with hearing loss. Early intervention, carried out through the participation of children and parents in the rehabilitation treatments, should help parents understand what the hearing loss brings, as well as help them gain confidence in parenting. It should also help parents realize the strengths and needs of their child and to enable a child to acquire necessary language skills that are essential in order for a child to become an equal member of the society.

Key words: family, children with disabilities, deaf and hard of hearing children

INTRODUCTION

Family is the basic unit, a micro-universe of society. It is one of the most important transferors of social influences and at the same time it is subject to influences within social and economic structure. One of the most important family roles, beside reproductivity is providing economic, emotional and psychological security.

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Determining the type and quality of communication which enables the best possible functioning within family group, as well as within society, has very important place in family studying. Family is the source and sanctuary, the place of various, healthy and pathological ways of giving and taking.

Most often we approach the family phenomena from the sociological and psychological point of view. From the sociological and historical point of view, family organization has suffered significant changes in structure, dynamics and function priorities. The processes of industrialization and urbanization have led to the disappearance of the patriarchal family structure and its values, extended family becomes nucleus, there is a weakening of family cohesion and rise in members individualization within family group, sex roles are changing, as well as views on marriage and its way of functioning, social mobility of family members rise and the strong basics of what the family structure used to be are weakening.

That's the reason for new ways of family organization to appear. Along with change in modern family structure, family functions and society functions somewhat differ. Family values, customs and habits can be more or less conservative than social. While accepting that in social life, an individual has many different roles, he demands to satisfy his various psychological needs within family life. The impossibility of satisfying these needs leads to faster disintegration of modern family in relation to the historically older patriarchal family where the economic function and the need to maintain structural stability of the family group (thus for maintaining social stability) had greater significance.

Summarizing the basic characteristics of family groups M. Mladenović states that "the family is the basic social group, depending on the historical and socio-economic development, brings together persons related by marriage and their offspring, and possibly even broader or narrower circle of blood and other relatives, who gather to satisfy a variety of biological needs (satisfaction of sexual desire, procreation and raising children), economic needs (production, consumption, exchange), social (protection of family members), educational, emotional and other needs. "

The family group is different from other social groups because it has a distinct, structured, and largely shaped by culture, a set of roles and because inter-familiar interactions are more informal.

These interactions are based on long-term relationships of care and mutual assistance and less on shared interests and values, as is the case with friendly groups.

Family interpersonal relationships are more complex, more durable, more emotionally colored than the emotional connections in other groups.

There is constant reconstruction and construction of personal and group identity and constantly intertwining subjective and interpersonal within the group.

Well structured and cohesive group can provide existential framework, the sense of security and acceptance, the ability to express personal experiences, thoughts and feelings, feelings of competence, the ability of self-image reconceptualization, a realistic perception and acceptance of themselves and, basically, can satisfy many basic human needs.

Unlike described the "ideal" group, some groups remain unstructured, poorly connected, chaotic, so they fail to meet the needs of its members.

Instead of further describing various structurally-dynamic relationships here are a small group of Hasidic story that manages to vividly express the essential differences in the functioning of the group:

Instead of further describing various structurally-dynamic relationships within small groups we will tell a Hasidic story that manages to vividly express the essential differences in the functioning of the group:

“A rabbi spoke with God about hell and heaven. ‘I’ll show you hell,’ God said, and led the rabbi to the middle of the room with a giant round table. The people who sat there were starving and sad. At the center of the table was a pot of stew, which contained more than enough food for everyone. The smell of stew was so great that the rabbi experienced mouth watering. The people at the table held spoons with very long handles. Each of them realized that it was not possible to reach the pot of stew and take a spoonful, because the handle was longer than the bucket hands, and so they could not put food in their mouth. Rabin was a witness to their huge suffering.

‘Now I’ll show you heaven‘, said God, and went to another room that looked like the first one. And there was a big round table and also a pot of stew. As in the previous room, people had the same spoons with handles too long, but they were well nourished and plump, laughing and talking. At first rabbi could not understand. ‘All this is simple, but required a certain skill,’ God said, and added: “They have learned to feed one another.“

The Group is multi-layered holistic kind of entity. The group raises the level of emotional engagement, not allowing a passive, observational attitude, enters and conveys emotions in all members of the group, providing regulatory principles of living and supports the development of their own identity experience.

“‘Group’ “shakes up” ‘existential structure of man, because her work is unthinkable without the engagement of all three elements of the structural existence (according to Heidegger), without thinking (so that it could be possible to communicate at all) without fear (which is due to the conception of awareness of being thrown into the world) and finally, without understanding and speech,“ says P. Opalić.

According to J.Berger, the family is literally a school of life where the main means of teaching are live demonstrations, where teachers are people with whom the children have very close relationships and they communicate in all possible ways, verbal, non-verbal, concrete, symbolic and abstractly, through examples and through stories in which the characters are deeply engraved in the memory of the whole family. It is a school of life without equal, which uses an exceptional combination of circumstances which include: complete naivety of children or receptivity, heavy dependence on parents, natural events and their liveliness, extraordinary events and extraordinary thrill, powerful means of reward and punishment, which can produce life-long effects ... This family cosmology is very suggestive and benefits indirect, dramatic effects to achieve lasting impact.

Systematic approach to family

In modern psychological definition of the concept of family linear impact on individual family member is replaced by systematic family approach, to the study of the mental health of family life in constantly changing, mostly healthy or pathological, forms of interaction.

Systemat approach to family holds a holistic and dynamic model of the family as a universal (though heterogeneous) and distinctive social group. Questions of how to form such a complex entity, what are all the possible directions of mutual action, what are the criteria of healthy or dysfunctional family interaction, maintained or disturbing the stability, flexibility and cohesiveness of the family groups, family strength allowing expedient course of development of the family. When we talk about the dynamics of family relationships it should be noted that intrafamily conflicts can have different effects on individual members of the family group, that developing of individual and family identity interact with each other (in different ways) and that as much as in other social groups, family group faces the acceptance of certain roles and distribution of power and control options.

Hence, the emergence of ambivalent feelings towards the family as a group that is expected to provide all kinds of protection and security is also possible, but also, at the same time, it can give an individual member imperfect inferior role, which may be providing or denying. Acceptance of distorted or insufficiently favorable and affirmative or neurotic emotional role brings a secondary gain (in terms of gaining a greater degree of attention, protection or special privileges), but hinders the formation of individual and group identity. Experiences denial (real or imagined) can over each member of the family group work and feedback on the whole family.

According to a systemic approach, the family is dynamic whole or or dynamic structure, a system in which changes in one subsystem lead to changes in other subsystems in the functioning of the group and the individual members, a system that has its own, more or less flexible and permeable borders to the external environment or between individual subsystem, a group in which there is constant interaction and more or less established rules of relating to other members, the allocation of roles and usually hierarchical distribution of power.

From the empirical point of view it is important to answer the question of whether and under what conditions it is possible that (despite the dynamic interdependence of family subsystems) functionality of a subsystem maintains despite the disturbances in other subsystems. Does, for example, marital dysfunction subsystem necessarily leads to disturbances in performing parental functions (and thus to problems in child development), and whether, and how, in such conditions it is possible to preserve the parental coalition. Or, whether, and how, you can alleviate the often pervasive influence of disability or illness of a child on the marital relationship and the feelings of parental competence?

In an attempt to answer the various questions the theory that accept systematic approach emerged different models of family functioning.

Families with handicapped child

The birth of a child represents the change in family structure, a change that requires acceptance of new roles and brings new incentives in family dynamics. Birth of a disabled child or the knowledge that a child is with developmental difficulties, represents a stressor of different quality that makes family face special burden in the long run.

As in other, different stress situations, pain and suffering that brings knowledge of the child's disability could be the trigger for occurrence of different reactions and feelings on different levels. Shock, non-recognition of disability, ambivalence, resentment, discouragement, chronic tension, feelings of guilt, feelings of isolation, feelings of defeat, depression, feelings of helplessness, blaming others, loss of self-esteem – these are just some of the possible reactions. In addition, there is ongoing insecurity and greater anxiety of parents in raising the child, parents are less rewarded for children's achievement than parents of healthy children, there is a decline in expectations. The fear of marking family as different may appear, as well as problems with the acceptance of separation of the child in a special category. A particular source of suffering represents a lack of criteria for predicting the future of the child.

With birth of disabled child, preparation for the acceptance of parental roles (of a healthy child) becomes unfeasible. At the first step on the road towards parenthood, parents of handicapped child feel defeated. They need to change the model of parenthood they have built and to deal with many unknowns, both in terms of disability, as well as in terms of their own reactions and feelings.

Constructs about themselves, about the world of parenting, children, family life inevitably change. The system of values is usually reorganized. Unusual life circumstances impose the need for new models. The system constructs that parents have for prediction and interpretation of all aspects of life are changed. They must discover the wrong, perhaps unconscious, performances and spot new opportunities. The process of adjustment to disability can be understood as a process of reviewing, modifying and rebuilding the system constructs.

The first dramatic change in the constructs of parents begins when dealing with the diagnosis, that is, when faced with an event that until then was located outside the range of their concepts. Their system of interpretation of the world suddenly loses its meaning because the world has changed. Prediction becomes impossible until a new model which includes the notion of handicap is built. This process differs from parent to parent, depending on the difference in the ability to understand, the difference in previous knowledge, the degree of disability of the child and in plays about yourself. The high degree of anxiety caused by the knowledge of the child's disability imposes a necessity to change the conception of the child. With the acquisition of knowledge about disability and the child's reactions, anxiety is reduced or, possibly, just suppressed. Any deterioration reactivates anxiety. Changes in conception of the child depend on the construct about the child prior to knowledge about disability and the reactions of the child. Some parents see it as renewed connection with a child. Child also needs to develop a new constructs system. Parents' constructs about themselves are also changing. Condition of child disability undermines the parents' basic idea of themselves as a parent – the patron. The main biologically prepared reactions (and needs) of parents to protect their offspring (calf) is threatened. The sense of these basic inadequacy and pain that carries the feeling of powerlessness to help greatly complicate adjustment. The roots of self-esteem and previously built up system of values are being undermined. The fear of diversity, rejection, social isolation arises. Constructs about communication with other people change in a wide range of tendencies, starting from isolation from the others (due to psychological or practical reasons) to seeking social support (which is an essential adjustment factor).

Considering the degree of stress of knowledge about the child's disability M.Jerotijević states:

"Only a definite loss of the closest persons may be more distressing and painful than knowing that our child has serious problems in development. Fear, pain, injustice, powerlessness, loneliness, push away every other feeling. State of shock blocks reason. A long way of self-questioning begins and questioning of all that came before, a long period of distrust, escape from dealing with the problem and the search for even the smallest detail that would deny our doubts. "

Knowledge of disability of a child carries the anticipation of different losses- loss of previous and in future projected "normal" life, loss of biological and social "drawn" role of parents, the loss of the expected passing through all legislative stages of child development, loss of self-confidence and belief in some "established" values, loss of feelings of the security, loss of equality in social relations, etc. In families with a handicapped child common thing is chronic tension and grief.

Each category of disability sets specific problems to the child and the family, depending on the nature, severity, frequency and visibility of symptoms and the degree to which endanger the normal functioning. Every state of disability imposes specific stresses and imposes special requirements of endurance of the child and the family and their adaptation in the physical, emotional and social terms. The risk factors include characteristics of disability, the requirements in terms of care, simultaneous stressful situations, health problems or previous psychological problems of parents, problems of communication and relationships between the parents. On the other hand, the factors supporting the ability to overcome the ranks of family variables such as the absence of conflict, open communication, emotional expression, family cohesion and stability, and social, emotional and institutional support.

Acceptance of the child, his real qualities, not our own ideas about the child, in line with our expectations, it is particularly important for the development of a disabled child. According to G.Ružičić "acceptance of the child includes specific language of communication, specific emotional relations and specific patterns of behavior in the behavioral plan, which permanently as part of non-verbal behavior, follow verbal testimonies."

There are many rational or irrational, conscious or unconscious, objective or subjective factors that influence the formation of parent-child relationships. According to G.Zivković, parent-disabled child relationship in the beginning was "compromised, disabled, intersected, intermittent, in any case, inconsistent" and "incomplete or inadequate interaction can occur due to reduction of the quality and quantity of both sent and received messages (signals), incentives or requests and responses that therefore have no further appropriate incentive effect, and often not even real, expected (and necessary) response. In such circumstances there is a delay or even a complete lack of certain social pressures necessary to gradually develop habits, learning to control impulses and needs, in fact adjustment to the demands of the environment and reality."

Deaf and hearing impaired children

In addition to basic sensory deprivation, small deaf child is deprived of the use and understanding of speech, as the most important means of communication, through which is the easiest way to communicate ideas, needs, feelings, intentions, attitudes, bans, beliefs, etc. Deaf babies can not hear mother's voice or sounds produced by its actions or the actions of other people or objects in its immediate environment. Due to the limited experience and lack of emotional exchange cognitive, emotional and social development of the deaf child will be slowed.

In hearing impaired child and in acquired deafness degree of influence on the development of disability depends on the degree of hearing loss and the phase of hearing loss or deafness.

In terms of difficulty in cognitive development of deaf children V. Radoman states:

"Today in the psychology of the deaf there is no unique and specific answer to the question about the nature of intellectual abilities of people with hearing impairments, as much as, after all, the psychology of thinking has not solved the problem of the relationship of speech and language in the opinion. This psychological problem is especially sharpens the psychology of deaf resulting in two opposite conceptions of the cognitive abilities of hearing impaired children. On one side is a group of authors led by Pintnerom and Oleron who believe that deafness is accompanied by a specific cognitive deficiency, while on the other hand, the authors, led by Furt, which, based on Piaget's theory, believe that language and speech do not play a decisive role in the development of thinking, because thinking originate in actions, and that deaf children even verbally inferior, in terms of intellectual abilities develop undisturbed."

In young deaf children there is also the problem of identification with the parents with undamaged hearing. Some studies indicate that the child's emotional, social, and intellectual development favours growing up with deaf parents. In addition to the early use of gestural communication in such a family situation is more favorable emotional climate, primarily for ease of understanding and acceptance of the child and its problems and for ease of emotional communication.

On the issue of common personality characteristics of people with impaired hearing V. Radoman (1991) most frequently cited:

1. deficient social adaptation, social isolation and social immaturity manifested in the inability to take care of themselves and accept responsibility for their behavior. There is a greater degree of dependence and addiction, as well as a lack of socialization and respect for social norms;
2. deficient emotionality, emotional immaturity, instability and shallowness of emotional reactions, striving for the immediate satisfaction of needs, immaturity and dependence in the development of object relations;
3. egocentrism and lack of concern for others and damaged empathic ability;
4. rigid behavior, adherence to the rules of bookish etiquette. Some authors talk about stereotypes of conscience and socialization;
5. increased impulsivity: aggressive reactions, outbursts of anger and acting out behavior;
6. the restricted interests and poor motivation;

7. tendency to neurotic reactions and symptoms of psychotic reactions.

Increased inadjustment of the deaf can partially be explained by the emergence of tinnitus, i.e. experiences of occasional noise in their head.

System support to the family

Establishing good cooperation with the family in order to establish a system support to the family, requires many individual contacts, knowledge of its functioning, a lot of time and patience, as well as linking with experts in different fields. Many parents due to lack of information about who could help them, often feel completely helpless. These parents, with all the problems they face, become irritable, hostile, or depressed, show a lack of empathy for a child or can show various other negative feelings towards school and teachers.

We started from the fact that if we want to help a child it is important to work not only with him but also with their parents. And that every form of work with parents contributes to the general good in the child's development. According to Davis, H., basics of the establishment of partnerships include: respect, humility, openness, empathy and quiet enthusiasm. Davis, H. (1995, p.62) says, "A huge benefit is achieved if you have someone whom you respect and who sits quietly with you while you are in trouble, someone who won't try to take a leadership role or set some requirements."

Model of good partnership relations according to Davis include: close cooperation, common goals, complementary skills, mutual trust, negotiation, communication, honesty and flexibility. Mutual trust has both motivational and partner function, without it is not possible to establish a successful cooperative relationship. The main goal in helping parents to establish the partnership is to provide emotional and social support to them.

Empathic attitude is an important characteristic of a successful partner relationship.

The concept of empathy is relatively recent origin, although of similar processes in psychology has been talked about before, just not under that name. The term was first used by Titchener (1910), which he used in the sense of understanding of ourselves, but also in the context of understanding the other (Pigman, 1995; Titchener, 1910; according to Vukosavljević-Gvozden, 2002).

Freud believed that the path that leads to the identification of imitation to empathy is the way that leads to understanding of the mechanism that allows us to do what we can to take any attitude towards other people's mental life. He pointed out that through the empathy we gain a sense of inner understanding of the other person (Allport, 1961). Allport defined empathy as "imaginative transposing of ourselves into thinking, feeling and reaction of others" (Allport 1961).

Certainly, one of the most important questions regarding the definition of empathy, around which most of the authors disagree, is the importance of cognitive processes.

The cognitive aspect of empathy refers to the understanding of the state of consciousness of another person, or how certain events are acting on that person. While some authors believe that the cognitive empathy is prerequisite for the emotional, others believe that emotional empathy and harmonization of emotions with feelings of another person, is more important than cognitive.

In any case, the thing about everybody agrees is that empathy is a combination of cognitive and emotional processes, and that these two components are interconnected in a particular balance. It is certain that in order for empathy to occur, the emphasis should not be on neither one. If, in fact, cognitive component is exaggerated, any attempt at understanding and compassion for the other person will be only an intellectual attempt to understand her condition, which without accompanying emotional component is not sufficient for the emergence of empathy.

If, however, emotional component is exaggerated, it can cause loss of boundaries between self and others, which in turn makes it difficult to understand the other person and the occurrence of empathy.

However, although some authors define it as a cognitive awareness of internal states of other people, ie. their thoughts, feelings, perceptions and intentions (Hofman, 2003), the term empathy is most commonly used to indicate emotional empathy (Raboteg-Šarić, 1995).

So, we can understand empathy as the ability of reliving of the emotional state of another person and the understanding of their position (i.e. suffering, threat) based on perceived or imagined situations in which the person is. It is a relatively enduring personality characteristic that varies widely from person to person and is an essential precondition for sociability and professional performance. The mere presence of empathy, has a positive in a broad sense, therapeutic effect – both in the clinical situation and in human life in general (Kohut, 1982).

Taking into account that learning empathy process begins in the early age, and that as a learning process takes place through “emotion coaching” and everyday behavior through giving example, the role of parents is crucial (Stern, 1987).

The question that reminds the child to be empathetic is: “And how would you feel if it happens to you?‘ Infants and children who are toddlers learn most from the way that parents treat them when they are upset, scared or angry, it is far more important than the words they speak. Until pre-school age, the child can already begin to talk about it and to understand how others feel, and approximately at the age of 5 children can learn about empathy and through talking about hypothetical problems (eg. How would you feel if you someone took your favourite toy? How would your friend feel if someone took his toy?). At he age of 8, children can already begin to “bicker” about more complex moral decisions related to fact that other people’s feelings may be different from their own. Parental torments often cause lack of empathy in children of school age, and especially in children in the preadolescent period. Developmentally speaking, the child must be disconnected (separated) from their families in order to successfully entered adolescence and build their own identity, and to build relationships with people outside their own families.

A common example of this separation phase, (the usual development phase), for example, is lack of empathy of older child for the younger brothers or other family members (Pešić, 1989). It is important to know that the focus of the child in adolescence is relocated to different people and outside the family, so that, after forming his own identity outside the family, the need for “humilliating” the family members will fade away. It is therefore very important to help the child in thinking that goes beyond himself and includes the feelings and interests of others.

Helping the child to learn empathy certainly represents the expression of parental interest in their experiences, the expression of emotions (positive and negative), carefully and actively listening and asking questions that will help them clarify their thoughts and feelings. The more children's empathy, based on parental model is increasingly being developed, the more will child be able to connect on a deeper level with others. Also, simultaneously grows their ability to act in accordance with their empathic feelings, in the way of listening to other person, help them and show their generosity.

We have mentioned all of this, because although empathy is a universal phenomenon, it nevertheless finds its great and specific application in a row of helping professions, ie. professions that work with people in order to provide assistance (Radovanović, 1991). As much as the results in these areas are insufficient or conflicting, they are very important for empathic education of future members of professions which are about providing assistance (Žegarac, 1997; Radovanović, 1991).

Research in the field of empathy leads us to think about the impact of empathic learning, and professional adapting to other people's emotional discomfort. In Betson's paper (Batson, 2010) considerable evidence that empathy produces altruistic motive to care for someone and relieve their pain were presented. In addition to the altruistic component of empathy that Hofman (Hoffman, 1987), was talking about, empathic behavior is also part of morality, since moral dilemmas included the possible sacrifice: "Should you lie so that you do not hurt the feelings of friends? Whether or not to accept an invitation to dinner at the last moment?, Do you keep alive someone who will otherwise die? "and so on. These moral questions the author asked, were based on his belief that the roots of morality should be sought in empathy, because it represents a kind of complicity with potential victims (someone who is suffering, who is in danger or in distress), and thus participate in their affliction obliges people to respond and to help others. It is assumed that the same skills of empathic feelings (be in "someone else's skin") leads people to follow certain moral principles.

Also, empathy involves many aspects of moral judgments and decisions.

The examples can be find in researches in which the evidence is in favor of the victim. They show that, if the witness feels more empathy towards the victim, he is likely to testify in their favor (Hoffman, 1987). Also, the data show that the amount of empathy can question man's moral attitudes. Since empathy involves many aspects of moral judgments and decisions, and despite some "self-serving" elements, has certain characteristics that clearly define it towards the altruistic motive: causing trouble others and not their own, the main objective is to help others, not themselves, potential satisfaction of participants depends on their action for the purpose of reducing the trouble of another.

Early intervention

Early intervention is an integral part of the system support for families of children with disabilities.

Support for families with deaf and hearing impaired children begins soon after the baby is diagnosed with hearing loss.

The introduction of neonatal screening for hearing loss should encourage the development of early coordinated rehabilitation program for children with disabilities from birth to 3 years of age, and to ensure that children and their parents have the same right to appropriate free education as children without disabilities.

Early intervention carried through the participation of children and parents at the rehabilitation treatments should help parents understand what hearing loss brings and gain confidence as parents. They should also help parents to realize the strengths and needs of their child, and to enable the child to acquire the necessary language skills that it needs in order to become an equal member of society.

The two primary objectives of early intervention are:

The first objective is to help a child who has a hearing impairment to learn to communicate, to use any residual hearing and to be socially integrated. There are certain sensitive periods during which certain things are the easiest to learn, if they are missed, learning would be much harder later on.

The second objective is that diagnosed baby becomes a full member of their family. Each family member is important for the child's development, especially for his language and social skills.

Helping deaf children and hearing impaired children is quite different than the assistance to children with other disabilities.

Surdologist has specific knowledge to give parents and the child adequate access to the language. Defectology-surdologist has knowledge about hearing aids and cochlear implants. They can help parents to turn their home into a good environment with a lot of sounds. They know how to recognize the signs that a child gives about the most appropriate mode of communication. They understand very well the feelings of parents who are trying to make the most correct decisions regarding their child. They help them by making them acquainted with hearing impaired adult that are sometimes engaged in the work with the child. Surdologists monitor the progress of the child and help parents understand what is going on. Surdologist knows how to help a parent to help their child to develop skills at the same time as his peers. They will train parents to be able to help their child to listen through the conventional apparatus and CI. They will teach parents how to give the child the ability to look at their face and to follow mime and gestures so that the child can understand everyday situations.

Within the system parental support, the main goal is to enable parents to communicate with the child and to encourage its development, for parents to be part of the team in setting priorities for the child, and to assist parents in finding help centers to assist and answer their questions.

All children learn from their environment. Babies absorb language, cognitive abilities and social skills through interaction with the environment. They do this without effort, but deaf and hearing impaired children require experts who will help them acquire the language by using specific methods.

System support for parents of deaf and hearing impaired children consists of what?

Surdologist can help the family in the following way:

- Helps to determine the primary needs of the child and family. Works with parents to assess the strength of the child and the current development skills.

This includes the Individual Family Service Plan, which should lead us through the development of the child.

- Helps to assess progress and make new goals.
- Encourages communication between members and helps the child by introducing daily routine.
- Answers parents questions.
- Helps choosing the best method of communication with the child, providing support in assessing how the child responds, as well as the decision about communication approaches.
- Observers interaction, encourages positive and proposes new techniques to encourage the child to listen, watch and learn.

The important thing is that despite the fact that surdologist works both with the child and the family, is also present in other children's natural environments such as day care and schools. To the child that is deaf and uses sign language will suit the most environments where adults know the gestures and communicate in that way. Children with hearing aids and CI will require a quiet environment as they learn to listen, they also will need someone to check the batteries, and that puts olives correctly or to check the CI. People in the family, nursery, kindergarten and neighborhood need to know how to attract the attention of the child to grasp what the baby is looking at and to level with their line of sight.

Early intervention includes several key individuals who make up a multidisciplinary team, which will help parents in the process of building their baby's communication skills. During the first few years.

One person, especially an expert, is not allowed to decide what is best for the child. They have good information and advice to offer but it is more likely that the team will make a better decision than an individual. Parents are an important part of the team and should speak for their child. In general, team members will agree on the importance of baby's needs, and strong team will be active support for parents.

Parents are the most important members of the team, no one knows a child like them. They observe the development of the child from rolling over to the seating, from the babble to the first word, or the first gesture and gesturing to the first word in sign language. Parents put hearing aids to children, they talk to them. They are the ones that let the team know team when the child says the first word. Other experts know things that parents still learn, they know the ways to help the parent and child to communicate. They answer the questions and provide information from different sources, so that parents can make a decision based on the needs of the child.

At the child's earliest age, parents will need a person who specializes in helping family and the baby, at least in the beginning until all the family members get used to the new situation. That kind of person must possess knowledge of several disciplines but must primarily have experience in working with children with hearing impairments and their families.

For the development of the baby's brain thebest thing is very early stimulation. Experts monitor the baby and look for signs of developing and teach parents how to monitor progress. Together they are looking for signs of eye contact and gesturing by babies and their response to voice or gestures. There is a list of development that can be renewed every week, month or couple of months. There are games through which an expert can test the development and growth of the baby. Babies are changing rapidly in the first months and years, and it is important that during this development period changes are described every day.

At the beginning of providing support to parents the most important is information about how their baby likes to learn and communicate. Many babies respond well to hearing aids and CI, and are able to learn by listening, others learn by looking. If we pay attention to what they do and how they react to us, we will know how to encourage their communication and help parents. This decision is very important and must be based on an estimate that is up to date with developments. Later, as we watch a child we can make a new decision based on new information.

Often the hearing loss is accompanied by motor problems and balance problems. Many young children benefit from early occupational therapy or physical therapy.

CONCLUSION

It is important to help a parent to discover that deaf and hearing impaired child can grow to be productive, well-adapted person that is working, driving, person that gets educated, gets married, has a family, in fact, is not much different from normal hearing adult persons. Without any doubt, parents of children with disabilities are in more stressful life situation than parents of healthy children and there are differences on personality levels between them. System approach to family as well as support are very important and require more extensive and deeper knowledge about the forms of family functioning system of families having children with different categories of disabilities in order to find the most efficient approach to improving the functioning of each of these family groups.

System approach to the family and support are very important and require more extensive and deeper knowledge about the forms of family functioning system of families with different categories of children with disabilities with the aim of finding the most efficient approaches to improving the functioning of each of these groups of families.

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QUALITY OF LIFE OF PERSONS WITH PHYSICAL AND SENSORY IMPAIRMENTS IN SERBIA

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SUMMARY

Quality of life, as an important component of psychological welfare, has a special importance for persons with disabilities. The aim of the study was to find socio-demographic variables that are influential in this construct and to establish differences between persons with different types of disabilities. The sample (N=929) consisted of persons with physical (N=351), hearing (N=337) or visual (N=241) disabilities from five cities in Serbia. The World Health Organization Quality of Life (WHOQOL) scale was administrated. Gender, marital status, age, education, incomes, job, and where and with whom participant lives, proved to be important factors for the quality of life of persons with disabilities. Better ratings of quality of life were expressed in younger and more educated persons with disabilities, in those who were married and unmarried compared to divorced and widows, in the employed and students compared to the unemployed and retired, in those living with parents, with a spouse or with a spouse and children compared to persons living just with children. Participants with physical disabilities attained significantly poorer scores on all factors of the WHOQOL scale compared to participants with hearing and visual disabilities. The results of the study suggest that persons with physical disabilities experience lower satisfaction in all domains of quality of life compared to persons with sensory disabilities; and that a socio-demographic status is important in sustaining their quality of life. In developing intervening programs for persons with disabilities, socio-demographic variables influencing the quality of life of these persons must be considered. Holistic care for these people should focus on social support.

Key words: quality of life, persons with physical disability, persons with hearing impairments, persons with visual impairments

INTRODUCTION

Quality of life represents a construct often used in the domain of rehabilitation. It can be treated as a process, referent point, aim or psychosocial adaptation to chronic illness or to disability [1]. The World Health Organization defines quality of life as the personal perception of one’s own life position in the context of culture and in the value system of one’s own goals and expectations [2]. Quality of life has a subjective and an objective aspect. The subjective aspect deals with perceiving and evaluating one’s own welfare. The objective aspect is connected to these persons’ and their families’ micro-social circumstances, such as health, level of education, type, and condition of living, family status, employment status or financial situation. Dimensions of quality

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of life are physical, related to physical capacities and health; psychological, related to the cognitive and emotional performance of a person; and social, related to social integration and to social roles taken on.

Bishop explains that disability is an important life event that produces massive changes in the life of individuals [1]. Disability can endanger social integration and self-esteem and can lead to the adoption of an inferior role. Disability may affect quality of life. So the need to ameliorate the quality of life of persons with a disability seems to be important. The same aspects of quality of life appear to be important for persons with and without disabilities [3]. But, according to study results, a lower level of quality of life was experienced by persons with a disability compared to persons without a disability [4]. It was also established that different disabilities have different impacts on the global quality of life, in particular, in areas of functioning [5].

Quantitative research among participants with a spinal cord injury showed positive correlations between quality of life and health, social support, social functioning, mobility, preferred living situation, adequate income, being married and employed, satisfaction with social relationships, community participation and satisfaction with occupational engagement. There have been inconclusive results concerning relationships between quality of life and age, length of time since injury and gender [6]. The quality of life of people with a disability depends on many factors, but the focus of the research concerns the influence of socio-demographic variables, the type, and severity of impairment, the length of time since the onset of disability and optimism [7].

A lower degree of physical and mental health, of social functioning and of satisfaction with the quality of life was established for persons with hearing impairments [8]. Young people with hearing impairments, compared to youngsters of typical development, were less satisfied with many aspects of life [9], and older ones suffered from bad moods, depression, social isolation, bad health and low quality of life [10]. It was established that older persons with hearing and visual impairments were more concerned about lowered independence, bad mood, and depression, and children and young people about functioning in school and in sports in their age group [11].

As there were not many studies examining differences in the quality of life between individuals with different types of disabilities, the first aim of the study was to explore difference between quality of life depending of type of disability. The second aim was to explore the interconnectedness of different areas of quality of life and to find socio-demographic variables that are influential in these constructs.

METHODS

Procedure

The scale was administrated by the fourth-semester students of the Faculty of Special Education and Rehabilitation at University of Belgrade, trained in conducting interviews and administrating the scales. Contact with participants was obtained through organizations of people with different types of disabilities, from five cities in Republic of Serbia (Belgrade, Niš, Kragujevac, Vranje, and Leskovac). Only the participants who wanted to take part in the study were included. Informed consent was obtained from all individual participants included in the study. The assessment was done in a private room, 1.1, and lasted 20-30 minutes.

Sample

Participants were persons with any disorder of the musculoskeletal system (e.g., spinal cord injury, muscular dystrophy, multiple sclerosis, amputation, orthopedic cases, cerebral palsy) that may arise from various causes resulting in reduced mobility, and persons with hearing and visual impairments. The sample (N=929; M=51.1%, F=48.7%) consisted of persons with a physical disability (N=351), with a hearing impairment (N=337) and with a visual impairment (N=241). Participants had different ages, levels of education, employment conditions, and living arrangements (see Table 1).

Table 1 *The socio-demographic characteristics of the sample*

Age	18-25	26-45	46-65	66+			
	29.1%	35.3%	26.3%	9.1%			
Education	Unfinished middle school	Middle school	High school	University degree			
	6.1%	19.1%	59.1%	15.6%			
Employment	Unemployed	Student	Retired	Employed			
	34.3%	14.8%	23.6%	27.1%			
Lives with:	Children	Spouse	Spouse and children	Parents	Alone	Relatives	Other
	4.1%	16.2%	20.5%	39.8%	8.9%	4.2%	6.2%
Type of accommodation	Supported living	Institution	Other's apartment	Own apartment			
	3.7%	6.2%	49.8%	40.0%			

The instrument

The World Health Organization Quality of Life – BREF scale (WHOQOL-BREF) was administrated in the study. This scale has been developed by the World Health Organization in June 1996. The WHOQOL-BREF is a five-point Likert-like scale, with a total of 26 questions. A higher score corresponds to a better quality of life. The scale consists of four domains: physical health, psychological, social relationships and environment. The Serbian version of the scale was used in the study. The Portuguese version of the scale established high internal consistency for all of the scale domains (Cronbach's α range 0.84-0.94), as well as test-retest reliability (r range 0.67-0.86) [12]. In this study the Cronbach's alpha was 0.87 for physical domain, 0.83 for physical health domain, 0.57 for social relationship domain and 0.73 for environment domain.

RESULTS

Difference between quality of life in relation to the type of impairments

As Kolmogorov-Smirnov test for normality was significant (p<.00), which indicates that data significantly deviate from a normal distribution, the Kruskal-Wallis H test was conducted to determine participant's perceptions of quality of life depending on the type of impairments.

Hence, our sample encompassed of people with hearing, visual and motor impairments, the Kruskal-Wallis H test was applied so the differences between their quality of life can be explored. The statistical significance was established within physical domain (χ^2(2)=161.835, p<.00), psychological health domain (χ^2(2)=42.413, p<.00), social relationship domain (χ^2(2)=29.395, p<.00), and environment domain (χ^2(2)=23.601, p<.00). Mann-Whitney test revealed differences between people with motor impairments on one hand, and people with visual and hearing impairments, on the other hand. Persons with motor impairments expressed less satisfaction with their physical health (M=11.17, SD=3.06) than persons with visual impairments (U=23459, p<.00; M=13.6, SD=2.74) and persons with hearing impairments (U=28197.5, p<.00; M=14.09, SD=2.65). Also, participants with motor impairments considered that quality of their psychological health is lower (M=13.11, SD=3.07) than persons with visual impairments (U=30904.5, p<.00; M=14.6, SD=2.86) and persons with hearing impairments (U=45028.5, p<.00; M=14.38, SD=2.54). The social relationships were weaker at persons with motor impairments (M=13.87, SD=3.03) comparing with the social relationships at persons with visual impairments (U=31726, p<.00; M=15.13, SD=3) and persons with hearing impairments (U=49641.5, p<.00; M=14.68, SD=2.54). Lastly, participants with motor impairments had lower scores at environment domain (M=12.86, SD=2.3) than participants who had visual impairments (U=34588.5, p<.00; M=13.63, SD=2.37) and participants who had hearing impairments (U=47643.5, p<.00; M=13.66, SD=2.89). The only difference between persons with visual and persons with hearing impairments was established within physical health domain. Participants who had hearing impairments were more satisfied with their physical health than participants with visual impairments (U=36392.5, p<.05).

Difference between quality of life in relation to the age of participants

A Kruskal-Wallis H test revealed statistically difference in perceptions of quality of life across all domains: physical health (χ^2(3)=64.123, p<.00), psychological health (χ^2(3)=35.851, p<.00), social relationships (χ^2(3)=43.485, p<.00), and environment (χ^2(3)=15.694, p<.01). Series of Mann-Whitney tests were performed to determine where differences exist between age's groups.

According to the age of the participants, younger participants (18-25; M=13.84, SD=2.24) were more satisfied in environment domain then group of participants aged from 26 to 45 years (M=13.22, SD=2.25) (U=37040.5, p<.01). Further, the younger participants (18-25) described their quality of life as more positive in all domains compared to the groups of participants, aged from 46-65. Detailed analysis showed that younger participants expressed more positive quality of life in physical health domain (U=24572.5, p<.00; M18-25=13.52, SD=2.99, M46-65=12.02, SD=3.19), in psychological health domain (U=27613.5, p<.01; M18-25=14.35, SD=2.75, M46-65=13.42, SD=3.17), in social relationships domain (U=28593, p<.01; M18-25=14.81, SD=3.26, M46-65=14.09, SD=2.88), and in environment domain (U=27025.5, p<.00; M46-65=13.01, SD=2.45). A similar distribution of the answers was displayed and among participants aged from 18 to 25 years and participants who were older than 66 years. Thus, the younger participants were more satisfied in physical domain (U=6498.5, p<.00; M66+=11.13, SD=2.97), psychological health domain (U=6728, p<.00; M66+=12.7, SD=2.73), and in social relationship domain (U=7261, p<.00; M66+=12.74, SD=3.02).

The differences between satisfaction within physical domain (U=30254.5, p<.00), psychological health domain (U=33173.5, p<.00), and social relationship domain (U=33339, p<.00) were established between participants aged from 26 to 45 years and those aged from 46 to 65 years. Younger participants expressed more positive attitudes in all domains: physical health (M26-45=13.41, SD=2.93), psychological health (M26-45=14.37, SD=2.71), and social relationship (M26-45=14.98, SD=2.97). The participants who had between 26 and 45 years reported greater fulfillment in physical domain (U=7957.5, p<.00), in psychological health domain (U=9039.5, p<.00), and in social relationship domain (U=8200.5, p<.00), than participants of 66 years and older. Finally, the participants aged from 46 to 65 were more contented in physical health domain (U=8798, p<.05), psychological health domain (U=9026, p<.05), and in social relationship domain (U=7763, p<.00) compared with the participants 66 years and older.

Difference between quality of life in relation to the gender of participants

There were no differences in reported quality of life between male and female participants.

Difference between quality of life in relation to the participant’s education

A Kruskal-Wallis H test showed difference across all domains of WHOQOL: physical health (χ^2(3)=59.146, p<.00), psychological health (χ^2(3)=57.851, p<.00), social relationship (χ^2(3)=54.459, p<.00), and environment (χ^2(3)=20.386, p<.00) in relation to participant’s education. The Mann-Whitney test revealed that participants who didn’t finish middle school expressed a lower level of satisfaction in social relationship domain (U=3434, p<.01; M=12.23, SD=2.94) than participants who had finish middle school (M=13.65, SD=2.99). In addition, participants who didn’t finish middle school reported less satisfaction in physical domain (U=8164, p<.00; M=10.93, SD=2.92), in psychological health domain (U=9847.5, p<.00; M=12.49, SD=2.99), social relationship domain (U=7935, p<.00), and in environment domain (U=11729.5, p<.05; M=12.7, SD=2.67), compared with the participants who finished high school (M=13.16, SD=3.02; M=14.18, SD=2.79; M=14.76, SD=3.04; and M=13.43, SD=2.28 retrospectively). Further, participants with unfinished middle school expressed a lower level of satisfaction across all domains compared with the participants who graduated from college. Hence, they have lower scores in physical health domain (*U*=1807.5, *p*<.00), psychological health domain (*U*=2062.5, *p*<.00), social relationship domain (*U*=1730, *p*<.00), and in environment domain (*U*=2703.5, *p*<.01), compared with the graduated participants (*M*=13.71, *SD*=2.89; *M*=14.95, *SD*=2.84; *M*=15.33, *SD*=3; and *M*=13.9, *SD*=2.26, retrospectively). Comparison between participants with middle school education and participants with high school education revealed differences across all domains. Participants who had finished middle school reported lower gratification in physical health domain (*U*=36519, *p*<.00; Mms=11.79, *SD*=3.25), psychological health domain (*U*=36156.5, *p*<.00; Mms=12.88, *SD*=2.83), social relationship domain (*U*=38836.5, *p*<.00; Mms=13.65, *SD*=2.99), and environment domain (*U*=42349, *p*<.01; Mms=12.85, *SD*=2.4). The same distribution of the answers was obtained comparing the report of the participants with middle school education and graduated participants. Thus, the participants with lower educational level expressed less satisfaction in physical health domain (*U*=8398.5, *p*<.00), psychological health domain (*U*=7733, *p*<.00), social relationship domain (*U*=8842, *p*<.00), and in environment domain (*U*=9756.5, *p*<.00) compared with participant with college diploma.

Differences between participants with high school diploma and graduated participants were established in following domains: psychological health (*U*=33497, *p*<.01), social relationship (*U*=35748, *p*<.05), and environment (*U*=35394, *p*<.05), in that direction that lower educated participants expressed lower level of fulfillment in quality of life.

Difference between quality of life in relation to the employment status

According to employment status, significant differences were established across physical health domain ($\chi^2(3)=100.276$, *p*<.00), psychological health domain ($\chi^2(3)=70.055$, *p*<.00), social relationship domain ($\chi^2(3)=63.830$, *p*<.00), and environment domain ($\chi^2(3)=16.871$, *p*<.00). The Mann-Whitney test was conducted in order to examine the difference between groups with different employment status. Unemployed participants were less satisfied in physical health domain (*U*=15368, *p*<.00; *M*=12.43, *SD*=3.08), psychological health domain (*U*=15053.5, *p*<.00; *M*=13.45, *SD*=2.81), social relationship domain (*U*=16319.5, *p*<.00; *M*=14.05, *SD*=2.98), and environment domain (*U*=16615, *p*<.00; *M*=13.1, *SD*=2.32) than participants who attended school (*M*=13.94, *SD*=2.98; *M*=14.87, *SD*=2.74; *M*=15.23, *SD*=3.22 and *M*=14.01, *SD*=2.28, retrospectively). Further, the difference between unemployed participants and retired participants was revealed in physical health domain (*U*=29169, *p*<.01; Mre=11.48, *SD*=3.32), so retired participants expressed lower satisfaction in this domain. Unemployed participants expressed lower level of contentment than employed participants in physical health domains (*U*=27362.5, *p*<.00; *M*em=14.04, *SD*=2.42), in psychological health domain (*U*=27794.5, *p*<.00; *M*em=14.92, *SD*=2.28), in social relationship domain (*U*=28949, *p*<.00; *M*em=15.46, *SD*=2.72), and in environment domain (*U*=35488.5, *p*<.00; *M*em=13.51, *SD*=2.09).

Similar, the retired participants were less satisfied across physical health domain (*U*=8715, *p*<.00; *M*=11.48, *SD*=3.32), psychological health domain (*U*=9993.5, *p*<.00; *M*=13.02, *SD*=3.28), social relationship domain (*U*=10326.5, *p*<.00; *M*=13.52, *SD*=3.13), and environment domain (U=12199.5, p<.01; M=13.13, SD=2.62), than participants who attended the school. Also, the retired participants expressed lower scores within physical health domain (U=15063, p<.00), psychological health domain (U=18472.5, p<.00) and social relationship domain (U=17968, p<.00) than employed participants. On the other hand, employed participants were less contented with their environment (U=14997.5, p<.05) than participants who attended the school.

Difference between quality of life in relation to the marital status

According to marital status, the Kruskal-Wallis H test revealed difference across physical health domain ($\chi^2(3)$=47.689, p<.00), psychological health domain ($\chi^2(3)$=29.763, p<.00), and social relationship domain ($\chi^2(3)$=73.717, p<.00). The Mann-Whitney test compared satisfaction of quality of life within each of domains in relation to the marital status. The unmarried participants considered that they have better physical health (M=13.27, SD=2.94) than married participants (M=12.76, SD=3.19) (U=78571.5, p<.05). In opposite, married participants felt that they have a better social relationship (M=15.24, SD=2.74) than unmarried participants (M=14.37, SD=3.18) (U=73705, p<.00). Participants who were divorced were less satisfied across physical health domains (U=6617, p<.01; M=11.5, SD=3.29), psychological health domain (U=7487.5, p<.05; M=12.6, SD=3.86), and social relationship domain (U=6239, p<.00; M=12.42, SD=3.09), compared with the unmarried participants (M=13.27, M=14.04, SD=2.86, M=14.37, retrospectively). Also, the participants who were divorced evaluated their physical health (U=5267.5, p<.05), psychological health (U=5059, p<.05), and social relationships (U=3295.5, p<.00) not as good, as married participants did (M=12.76, M=14.25, SD=2.75, M=15.24, retrospectively).

Similar, the widows/widowers experienced less satisfaction of their physical health (U=4571.5, p<.00; M=10.05, SD=2.85), psychological health (U=6048.5, p<.00; M=11.86, SD=2.55), and social relationship (U=5222.5, p<.00; M=11.57, SD=2.38), than unmarried participants. Finally, the widows/widowers were less happy with their physical (U=3836, p<.00) and psychological health (U=3997, p<.00), as with social relationships (U=2362.5, p<.00) compared with the married participants. The participants who are divorced were more satisfied with their physical health than widows/widowers (U=597.5, p<.05).

Difference between quality of life in relation to the family situation

The Kruskal-Wallis H test revealed difference across physical domain ($\chi^2(6)$=35.467, p<.00), psychological health domain ($\chi^2(6)$=26.435, p<.00), social relationship domain ($\chi^2(6)$=72.609, p<.00), and environment domain ($\chi^2(6)$=17.086, p<.01), between participants with different family living situation. Further, Mann-Whitney test showed that participants are less satisfied with physical health if they live with children (M=10.38, SD=3.19) than if they live with parents (U=3636, p<.00; M=13.29, SD=2.97), with spouse (U=1853.5, p<.00; M=12.49, SD=3.05), with spouse and children (U=2101, p<.00; M=13, SD=3.2), with others (U=532, p<.00; M=13.3, SD=3.17) or alone (U=996.5, p<.00; M=12.73, SD=3.11). Also, participants who lived with children expressed less satisfaction with their psychological health (M=12.14, SD=3.62) than participants who lived with parents (U=4892, p<.01; M=14.07, SD=2.73), with spouse (U=2066.5, p<.01; M=14.02, SD=2.91), with spouse and children (U=2363, p<.00; M=14.42, SD=2.64), with others (U=650, p<.01; M=14.37, SD=3.05) or alone (U=1300, p<.05; M=13.54, SD=3.18). Further, participants who lived with children considered that their social relationships are poorer and weaker (M=12.14, SD=2.93) than participants who lived with parents (U=4147.5, p<.00; M=14.52, SD=3.15), with spouse (U=1359.5, p<.00; M=15.05, SD=2.91), with spouse and children (U=1533.5, p<.00; M=15.39, SD=2.61), with others (U=707.5, p<.05; M=14.05, SD=3.71) or alone (U=1204, p<.05; M=13.58, SD=2.95). Finally, participants who lived with children had lower scores at environment domain (M=12.53, SD=3), than participants who lived with parents (U=5686, p<.05; M=13.62, SD=2.23).

The social relationships are weaker for the participants who lived with others (that can be living in an institution, in a group home, etc.) than for participants who lived with spouse and children (U=4030.5, p<.05). On the other hand, participants who lived with others considered their environment as more rich and better than participants who lived alone (U=1670, p<.05).

The participants who lived with the relatives (M=11.6, SD=3.04) considered their physical health as lower quality than participants who lived with others (U=689, p<.05), with spouse and children (U=2707.5, p<.05), and with parents (U=4753.5, p<.01). Also, the participants who lived with the relatives (M=12.32, SD=3.09) were less satisfied with their psychological health than participants who lived with others (U=601.5, p<.05), who lived with spouse (U=1993, p<.01), with spouse and children (U=2238, p<.00), and with parents (U=4726.5, p<.01). The social relationships were less developed at participants who lived with relatives (M=12.25, SD=2.63) than participants who lived with others (U=679.5, p<.05), with spouse (U=1229, p<.00), with spouse and children (U=1366, p<.00), with parents (U=3845.5, p<.00), and then who loved alone (U=1136.5, p<.05). Satisfaction with the environment was lower of participants who lived with relatives (M=12.58, SD=2.31) than participants who lived with others (U=710, p<.05) and with parents (U=5238, p<.05).

Quality of physical health was evaluated as lowest at participants who lived with a spouse than who lived with parents (U=23895.5, p<.05). On the other hand, participants who lived with spouse expressed greater satisfaction with their social relationships and environment than participants who lived alone (U=4637, p<.00, U=5513, p<.05, retrospectively). More, participants who lived with spouse and children were more satisfied with their psychological health and environment than participants who lived alone (U=7075, p<.05, U=6968.5, p<.05, retrospectively). The social relationships were better for participants who lived with spouse and children than participants who lived with the parents (U=29667, p<.01), and who lived alone (U=5386, p<.00). The participants who lived alone were less satisfied with their social relationships and environment than participants who lived with the parents (U=13038, p<.05, U=12345.5, p<.01, retrospectively).

DISCUSSION

In the conducted study it was confirmed that socio-demographic variables play an important role in the experienced quality of life of the persons with disabilities. Also, type of disabilities has an influence on the evaluated quality of life.

Different types of disability have various impacts on the quality of life and on various aspects of functioning [5]. In this study persons with sensory disabilities are found to feel more satisfaction in various domains of life than persons with physical disability. In the study exploring experiences of the persons with physical disabilities [24], it was established that disability influenced mostly the psychological domain of quality of life, including negative feelings, body image, physical appearance, spirituality, and self-esteem. Comparing experiences of persons with different types of disability it was concluded that the most negative perception of quality of life had participants with physical disabilities, due to lowered possibility to decide and act independently [17]. In the same study, it was established that persons with hearing impairments had a more positive perception of thequality of life than persons with intellectual disability and with a physical disability. Such perception reflects stronger feelings of social integration and independence for people with hearing impairments. The finding that persons with spinal cord injury rated lower the quality of life compared to persons without disabilities [25] was explained by the lower level of social integration and by secondary consequences of injury, such as chronicle pain and urinary infections. Persons with visual impairments reported the worse perception of all domains of quality of life compared to the general population, to the persons with hearing impairments and to those suffering from type 2 diabetes [14].

Compared to older participants (45+), younger participants (18-45) with sensory and physical disabilities seem to be more satisfied with quality of life across all domains, which can be attributed to stronger expectancies and stronger readiness of anticipating positive outcomes in future in younger age, as well as to often worse health status, lower functionality[13] and to restricted interpersonal communication in older age. In our study, it was established that the decline in positive thinking and positive experience of life begins after the age of 45.

The differences between genders were not confirmed in our study, which leaves an open question for future studies. The results from previous studies are not completely in agreement, so among persons with visual impairments, male participants reported better quality of life than female participants [14], while females with spinal cord injury reported slightly higher life satisfaction than males participants [15].

In the presented study, more educated participants reported the higher quality of life than less educated ones. Perhaps they have more efficient coping strategies, especially in the psychological domain, and in gaining benefits of social support as they are more familiar with their rights and opportunities. In Langelaan research more educated participants with visual impairments showed higher problem-solving capacity [14], which could contribute to higher satisfaction at educated participants, as they were able to gain more benefits for themselves.

Employed participants and students scored better in all life domains than unemployed and retired participants. The result is in the line with findings that employed persons with spinal cord injury [16] and employed visually impaired persons [17] reported higher levels of quality of life than unemployed individuals with the same disabilities. Employment status appeared to be important for social identity and feeling of self-esteem of persons suffering from schizophrenia while unemployed felt isolated and marginalized [18]. Satisfaction with life situation in persons with physical disability is connected to the profession or important activities, to social integration, to a sense of life meaning [19], and to increased independence [20]. These studies confirm that engagement in purposeful activity supports satisfaction with various life domains. This finding is in the line with the results of our study, according to which difference between employed participants and students has been shown only within environment domain. This finding could be explained by more responsible and stressful work environment, in comparison with the school environment.

Married and unmarried participants are more satisfied with different life domains compared to divorced participants and widows. Married, in comparison to unmarried participants, have better interpersonal connections. Marital status seems to be connected to the social support. In a studyof Schultz and Decker [21], it was established that adaptation of person to own disability depends on partner's support. So, the loss of marital social support in divorced and widows may lead to a lower rating of the quality of life and to less optimistic life standpoint. In the Kreuter et al. study [22] the half of the sample reported separation from a partner after the injury, which could lead to less satisfaction with overall quality of life.

Participants living with children were less satisfied with physical and psychological health, with social relationships, and with being supported compared to those living with parents, with a spouse or with spouse and children. Dissatisfaction with life could be a consequence of the burden of child-rearing which leaves a little free time for a single parent, especially for those with a disability. A single parent in these circumstances doesn't have enough time to take care of own health, psychological needs and the need for social relationships. In addition, persons with disabilities who live with parents probably have better care, and they are more satisfied with possibilities of maintaining their overall health, especially physical health.

CONCLUSION

Results showed that better ratings of quality of life express persons with sensory disabilities, younger and more educated persons with disability, those who are married and unmarried compared to divorced and widows, employed and students compared to unemployed and retired, those living with parents, with partner or with partner and children compared to persons living just with children. In developing intervening programs for persons with disabilities it must be considered social integration, possibilities of employment or engagement in meaningful occupational activity. Special attention must be attributed to persons with physical disability, who reported a lower level of satisfaction with the quality of life, as well as to older persons with disability, having in mind that in older age usually declines social support, health, and purposeful activities.

All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

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MARITAL RELATIONS AND COPING STRATEGIES IN PARENTS OF CHILDREN WITH CEREBRAL PALSY

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SUMMARY

Parents of children with cerebral palsy are faced to a variety of challenges in order to answer to the demanding medical procedures, exceeding typical child development needs, and overcoming disappointments related to a child diagnose. Most of the families develop resources and capabilities to overcome and adapt to a new circumstances.

The purpose of a study was to examine the quality of interpersonal relationships in families of children with cerebral palsy. The part of this wide study, shown in this paper, refers to marital relations and coping strategies in parents of children with cerebral palsy.

Sample included 80 parents (married or single), divided in three groups of 20 parents, based on whether child had a mild, moderate or severe level of impairment, and fourth group of 20 parents, as a control group. Measuring instruments were "Marital adjustment test", "Family environmental scale" and "Coping health inventory for parents".

The result indicated that the relations in the marriage subsystem in families with cerebral palsy are different depending on a severity of cerebral palsy. The quality of marital relations does not depend on the intellectual status of the child. Results on Coping health inventory for parents showed that parents usually recourse to the coping pattern 2: maintaining social support, self-esteem, and psychological stability. Results shows significant correlation between "Family environment scale" and "Coping health inventory for parents".

Findings have implications for present strategies of health care delivery and for health care professionals' attempts to facilitate family adaptation to the stresses of child disability.

Key words: parents, family, cerebral palsy, coping, resilience

INTRODUCTION

Specifics of the family system of a child with cerebral palsy

Managing the lifetime care of a child with cerebral palsy is challenging both physically and psychosocially. Families are faced with unique stressor and demands in life. The birth of a child with disability, with exceeded typical child development needs and unpredictable prognosis, usually caused a strong quake of family structure and dynamics. Cerebral palsy is a static lesion occurring in the immature brain that leaves children with a permanent motor impairment (Miller, 2005). Depending on a degree and location of a brain injury, these children can also have cognitive impairment, vision and hearing problems, speech and language difficulties, sensory deficits and seizure disorders. Previous concept of family functioning needs a complete revision and adaptation to a child health condition. This is a long process with uncertain outcome. The way the family faces problems determines the course of development of the child. Consequently, there are many disorders in families taking care of child with disability cited in literature: mental disorders in children, brothers, sisters and parents; divorce, disturbed relations between parent-child (Stanimirović, 2004).

According to a family system theory approach, as a complex and dynamic patterning of individuals and interactions, problems in family functioning caused by a cerebral palsy diagnose, through a circular causal system transfers to all subsystems.

Although literature suggesting that stress, grief, and other factors associated with parenting of a child with disabilities, results in high rates of marital dysfunction, marital dissatisfaction and divorce, this notion is poorly supported by research. Research demonstrates that parents of children with disabilities have marriages that exhibit the full range of function and dysfunction seen in the general population. Most parents of children with disabilities have functional marriages, and the same things that predict healthy and unhealthy marriages in the general population also predict healthy and unhealthy marriages among parents of children with disabilities (Sobsey, 2004). Wiegner and Donders (2000), found that the unequal distribution of roles in the daily care of a child can lead to feeling overburdened by one parent.

Živković (1994), based on study conclusions, generalize that: 1. The father usually leaves the family, 2. family breakups are more common in young parents or where the marital relations already were dysfunctional, and in the families where the child has severe developmental disabilities. Longo and Bond (1984), cited Friedrich's (1979) research about the mechanisms of successful overcoming a consequences of the birth of a child with a disability. He found that marital satisfaction was the most accurate predictor of successful coping and accounted for 79% of the variability in the findings in his study. Mitić (1997) research indicates that spouses almost opposite and different perception of the situation caused by birth of child with disability, is an important indicator of marital and family dysfunction (fathers are perceived family as a unique, while the mother is considered to be divided, on the one side – father, on the other alliance mother-child). In the same study, wife does not have enough support from a partner, doubt his loyalty, and husbands 'escape' from home because he cannot cope with the diagnosis of a child and unhappy wife. Britner et al. (2003) in study compared a group of parents with a child with cerebral palsy and parents with healthy child. Results indicate that there were no overall differences in self-reported family functioning according to presence of severity of the child disability. In both groups of parents, marital quality may have buffered parenting stress. Mothers reported higher levels of marital satisfaction inversely proportional to a less parental distress, regardless of the child's condition. The author states that this information correlates with the results of some previous studies, for example Kazaka (1987, 1989), and Redone (1992). The results of Button et al. (2001) study, showed no relation between maternal stress and partner support; child's level of impairment and the interaction between partner support and child impairment were significant predictors of maternal stress. Florian and Findler (2001), compared 80 mothers of children with cerebral palsy with mothers of healthy child. There were significant differences between the two groups, and indicated that among mothers of children with cerebral palsy, self-esteem, self-mastery, and family network were the main variables that contributed to mothers' psychological and marital adaptation. The most important and most helpful person according to Ueda and Hirose study (1990) about the relationship between the parents of children with cerebral palsy – is spouse.

Resources and resilience

Healthy family forces can be activated in each family in order to accept responsibility for the further development perspective (Arcus, Schvaneveldt, Moss, 1993). Successful family adaptation to stress involves at least two major sets of family resources. First, the family must have or develop such internal resources, as integration and adaptability in order to withstand the social and psychological stresses to which it may be exposed. Second, the family must have or develop a range of coping behaviors directed at strengthening its internal organization and functioning, procuring social supports and reducing or eliminating the sources of stress (McCubbin, 1979). Resources are available characteristics of persons, families and communities, including restrictions that inhibit the use of available resources, in a situation assessed as stressful (Stanimirović, 2004). Resources can be inside and outside the family. Inside family resources, usually cited in the literature are: the cohesiveness, the emotional connection between family members, adaptability, ability to change the family system in the sense of family coherence, understanding of events within the family and finding meaning in family life (Dragojević, 2006). Quality of communication, independence family members and strengthening self-esteem, clear family boundaries, empowerment to seek social support, control stressors and adaptability is important factors for successful functioning of internal family resources (Ružičić, 2005). External resources are located in the wider family, friends and the wider social environment. In theory, between resources and ways of coping stress is the concept of resilience, which has long been associated with individual responses to stress, and since has expanded to the family.According to McCubbin and McCubbin (1993), the Resiliency Model emphasizes the post crisis, adaptation phase. It attempts to explain why some families are "resilient" and recover from crises while others stay vulnerable or deteriorate after crises.Resilience model evolutes from family deficit and pathology – as a "model of damage," to the model of family power and resources in order to overcome and adapt (Krstić, 2013). The basic premise of the family system theory suggested that the process of resilience to severe life challenges, such as health crises and continuing health conditions, have an impact on the whole family, as well as on key processes that affect optimal functioning, adaptation and resilient power of the individual and of the whole family. When families draw on their resources for resilience, they pull together, make the best of their situation, and emerge stronger and better able to meet future challenges. A family resilience practice approach aims to identify and build key relational processes, with the conviction that both individual and family benefits are forged from adversity through collaborative efforts (Pehler, Craft-Rosenberg, 2011). Walsh (2003) family resilient box contains nine key processes in three areas: 1. Belief systems (including make meaning of adversity, positive outlook and transcendence and spirituality; 2. Organizational patterns, (including flexibility in the adaptation, connectedness, and social and economic resources; 3. Communication/

problem solving (including the clarity of information and discussion about the illness, open emotional expression and collaborative problem solving).

Research resilience of families with a child with disability shows us different results. Research of Ungar (2011) and McConnell et al. (2014) suggested that resilience directly correlates with the availability of socio-economic resources and emphasize that most of these families work well with significant social support and low financial difficulties. Greeff and Nolting (2013) research result showed positive correlations between an acceptance of the situation, positive patterns of family communication, commitment to the family unit, a positive attitude toward new experiences and challenges, and family adaptation, whereas incendiary communication and the age of the child were found to be inversely correlated with family adaptation. The quality of family patterns of communication was found to be the most significant predictor of family adaptation. .

The researcher in our region, Krstić (2013) found that high levels of stress in mothers of children with cerebral palsy is a risk factors for mothers' resilience. Resolution status is an essential condition for adaptation to the child's diagnosis. Functional status of the child and maternal depression are important for the prediction of maternal status resolution.

Coping strategies

In the literature, we can find different synonyms related to this problem. Styles used to overcome, coping strategies, efforts and ways to overcome the crisis are some of them. Stress management according to a family system theory includes a wide range of variables, classified in two major groups:

- Focus problem strategies, oriented on changing event or situation, which involves the use of problem-solving skills or minimizing its consequences, resolving interpersonal conflicts, seek advice, time management, goal setting and collecting information about what caused the stress,
- Focus emotional expression strategies, oriented on internal resources in order to change the thoughts or feelings about the stressful situation or event. This includes denial of the existence of stressful situations and the free expression of emotions (Sharma, 2011).

In family systems theory, we can find many other categories as a coping concept. Ružičić (2004) lists three sub-categories:

1. Overcome resources, general attitudes and skills, which include attitudes towards themselves (self-esteem and ego-strength); attitudes towards the world (the feeling of coherence and belief in the ability to control external events) and intellectual skills (cognitive strength and cognitive flexibility);
2. Overcoming styles – generalized coping strategies defined as a typical learned preferences in the way of approaching problems (withdrawal tendencies – approaching, activity – passivity, etc.);
3. Overcoming attempts – the specific actions taken in specific situations in order to reduce stress or problems (cognitive assessment of the problem, or inhibition of the emotional expression, solicitation or refusal of assistance, etc.).

Lazarus and Folkman (1984), defined coping strategies as a process, not as an isolated attempt for overcoming stress. That fact was crucial in establishing of modern theory stress concept. Lazarus and Folkman coping model present eight strategies for coping with stress: confrontation, distancing, self-control, seeking social support, acceptance of responsibility, escape – defense, scheduled problem solving and positive reevaluation.

Because of the unknown outcomes and prognosis of cerebral palsy, parents may need to develop several different strategies for coping. Lack of coping mechanisms in parents cause reduced quality of life and prolonged effects of stress. It is important to point at families strengths and abilities as soon as possible (Retinck et al., 2006). Many parents use religion and faith as a method of coping, and spirituality has been shown to be a source of strength and purpose for both the family members of disabled people and children with disability (Poston & Turnbull, 2004).

Study which purpose was to examine the critical family strength in families with child with cerebral palsy (McCubbin, Huang, 1989), emphasize the importance of family resource assessment and communication, as a key factor for overcoming stress and adaptation.

METHOD

Sample

The sample included 80 families with child with cerebral palsy: 20 families with child with mild form, 20 families with child with moderate form and 20 families with child with severe form or child with multiple disability. Control group included 20 families with healthy child.

The sample included the parental couple or single parents with cerebral palsy child, aged up to 14 years. Severity of a child’s disability was evaluated on a 3-point scale: mild, moderate and severe. The Gross Motor Function Classification System (GMFCS) measures severity of cerebral palsy and rates outcome of motor function in a scale ranging from I to V, and was completed by a physician. Cerebral palsy was graded as mild when the child was rated as I/II level, moderate if child was rated as level III, and severe when the child was wheelchair dependent-IV/V level. Sample was dichotomy divided according to intellectual status as the criterion variables in children with and without intellectual disabilities. Patient case histories were the source of data of the intellectual status and were completed by psychologists.

Instruments and procedures

Locke-Wallace Short Marital-Adjustment Test (LWS – MAT, 1959), is one of the most frequently used instruments for the measurement of marital adjustmentand measures marital satisfaction, which is realized when the mates feel satisfied with the marriage and each other, develop common interests and activities and feel that marriage is fulfilling their expectations. The MAT is the gold-standard of public domain marital satisfaction measures. The scale focuses on issues such as involvement in joint activities, demonstration of affection, frequency of marital complaints, level of loneliness and well-being, and partner agreement on significant issues. A score of 100 is the dividing point between distressed and non-distressed individuals. The average score for distressed couples is 72 and the average score for non-distressed individuals is 136. Instrument is reliable and frequently used for evaluating marital relations. It is easy to administer, a higher score is directly proportional to greater satisfaction in marriage. Reliability of the test recently checked several times with a variety of research, arguing over the issue. Recent research has confirmed the reliability of the test examining the quality of marital relations (Freeston, 1997; Jiang et al, 2013).

Coping health inventory for parents; McCubbin et al. (1983), is a research and clinical instrument specifically designed to assess parent's perception of their response to the management of family life when they have a child member who is seriously and/or chronically ill. Inventory is valid and reliable, standardized and widely used in researches, shows useful for finding the right strategy to overcome health problems in the family. Coping health inventory is a 45-item, self report measure of the parent's coping activities in response to this general question: How helpful do you find each one of the activities below in handling the problems due to your child illness? Each item has four response categories on a Likert scale ranging from 0 to 3 (0 – not helpful, 1 – minimally helpful, 2- moderately helpful, 3 – extremely helpful) across behavior items within each pattern. Each of these statements and behavior patterns has an option – "I do not want" and "it was not possible". The scale includes 45 items, divided into three subscales:

1. Coping pattern I – Maintaining of family integrity, cooperation and optimistic definition of the situation (19 items);
2. Coping pattern II – Maintaining social support, self-esteem, and psychological stability (18 items);
3. Coping pattern III – Understanding of the information related to the child's health care through communication with other parents and consultation with the health care teams (8 items).

Family environmental scale (FES, Moos, Insel & Humphrey, 1974) comprises 90 true-false items and was designed to evaluating social climate of all types of families. This self report questionnaire is used to measure perceived family interactions by assessing three dimensions of the family and its social environment: the Relationships – the degree to which family members are perceived to be involved with each other and how openly positive and negative feelings are expressed, the Personal growth – the family of origin's goal orientation or ways the family of origin encourages or inhibits an individual's personal growth, and the System maintenance dimension – the degree to which the family emphasizes clear organization, control, structure, rules and procedures in running family life. The scale has been used to access family environment from the perspective of different informants within the family, as well as from from single family members' perspective (Kokkinos & Panayiotou, 2013)**.** Family interpersonal relationship cluster, contains 3 subscales : a) cohesion, b) expressiveness and c) conflict. Family personal growth cluster contains 5 subscales: a) independence, b) achievement, c) intellectual-cultural orientation, d) active-recreational orientation,

e) moral – religious emphasis. Family system maintenance cluster contains 2 subscales: a) organization and b) control.

Data processing

The data were analyzed by the following statistical procedures and methods: Measures frequency, Measures of central tendency (mean and standard deviation). When testing the significance of differences between the two groups on the numeric variables, the t-test for independent samples, and to distinguish between multiple groups analysis of variance. Statistical analysis was performed in the statistical package SPSS 20.0 for Windows.

RESULTS

The results of researching marital relations and coping mechanisms in families with children with cerebral palsy.

Table 1 *Quality of marital relations variable associated with the severity of cerebral palsy*

GMFCS	N	M	SD
GMFCS 1	17	90,94	31,154
GMFCS 2	15	84,73	25,886
GMFCS 3	15	58,33	26,340
Total	47	78,55	30,906

The results of ANOVA showed that marital relation variable were found significantly associated with the severity of cerebral palsy (F=5.91, df1=2, df=44, p=0.05, η^2=.21).

Table 2 *Quality of marital relation variable associated to the degree of severity of cerebral palsy*

(I) GMFCS		Mean difference (I-J)	SDe	**Sig.**	Confidence interval	
					Lower	Upper
Mild form of Cerebral palsy	Moderate	6,21	9,937	,823	-18,97	31,38
	Severe	32,61*	9,937	**,008**	7,43	57,78
Moderate form Of cerebral palsy	Mild	-6,21	9,937	,823	-31,38	18,97
	Severe	26,40*	10,243	**,045**	,45	52,35
Severe form of Cerebral palsy	Mild	-32,61*	9,937	,008	-57,78	-7,43
	Moderate	-26,40*	10,243	,045	-52,35	-,45

Group of parents of children with mild form of cerebral palsy (M=32.6, SD=9.9) has a significant better marital relations than a group of parents of children with severe cerebral palsy (M=26.4, SD=10.2), the level of sig. (p <.01). Group of parents of children with moderate cerebral palsy (M=6.21, SD=9.9) shows the significant better marital relations than a group of parents with severe cerebral palsy (p <.05).

Table 3 *Quality of marital relations variable associated with intellectual abilities of a child with cerebral palsy*

Intellectual abilities	N	M	SD
Average	23	80,35	33,762
Mental disability	24	76,83	28,526
Total	47	78,55	30,906

There is no significant difference between these two variables (F=.149, p=.701).

Table 4 *Marital relation variable comparing experimental and control group*

Group		N	M	SD	SeM
MAT	Control	15	85,13	30,727	7,934
	Experimental	47	78,55	30,906	4,508

Results indicates no significant difference between control and experimental group in marital relations variable (t=.719, df=60, p=.475).

Table 5 *Result distribution on Coping health inventory for parents variable associated to a severity of cerebral palsy*

	TOTAL	(n=60)	GMFCS 1	(n=20)	GMFCS 2	(n=20)	GMFCS 3	(n=20)	
CHIP	M	SD	M	SD	M	SD	M	SD	p
Coping pattern 1	1,5398	.33843	1,4887	,25292	2,0611	,36083	1,8580	,63008	.554
Coping pattern 2	2,0235	.42688	1,5264	,30641	1,9779	,36187	1,9393	,53988	.827
Coping pattern 3	1,9427	.57409	1,6042	,43646	2,0316	,54860	2,0307	,56502	.644

There is no significant difference among groups of parents in experimental group on the Coping health inventory for parents variable.

Table 6 *Result distribution on Coping health inventory for parents variable associated to a intellectual abilities of a child*

CHIP	Intellectual abilities	N	M	SD	SeM
Coping Pattern 1	Average	27	1,49	,252	,048
	Mental dis.	33	1,57	,394	,068
Coping Pattern 2	Average	27	1,97	,389	,075
	Mental dis.	33	2,06	,457	,079
Coping Pattern 3	Average	27	1,85	,607	,116
	Mental dis.	33	2,01	,545	,094

There is no significant difference in Coping health inventory for parents variable and intellectual status of a child with cerebral palsy.

Table 7 *Parental coping patterns and indices of family environment*

Indices of family environment	Interpersonal relationship			Personal growth					System maintenance	
Parental coping patterns	Cohesivness	Expressiveness	Conflict	Independence	Achievement	Intell.-cult orientatio	Recreational	Moral	Organizaton	Control
Coping Pattern 1	-,130	-,248	,119	,195	**,401****	-,252	**-,387****	-,180	**-,351****	**,278***
	,322	,056	,364	,135	,002	,052	,002	,170	,006	,032
Coping Pattern 2	,067	-,143	,200	,130	,018	,061	**-,310***	-,054	-,063	-,222
	,612	,277	,126	,322	,890	,641	,016	,681	,635	,089
Coping Pattern 3	-,044	-,107	-,049	,229	**-,409****	-,114	**-,254***	-,163	**-,392****	**,314***
	,737	,418	,709	,078	,001	,385	,050	,214	,002	,015

*p<.05. , **p<.01.

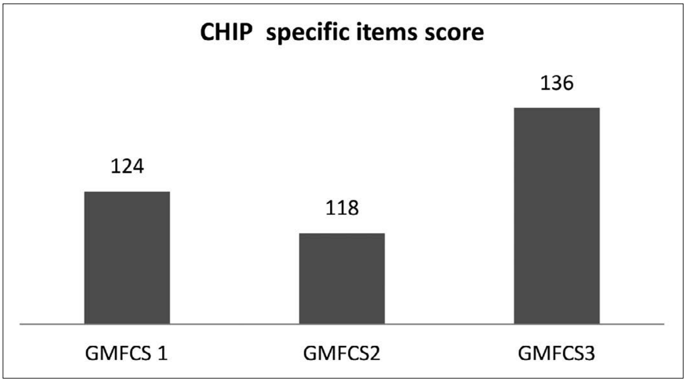
Parental coping patterns are associated with four indices of family environment. All three coping patterns are associated with dimension Active-Recreational in Personal growth cluster, coping pattern 1 (r=-.387, p<.01), coping pattern 2 (r=-.310, p<.05) and coping pattern 3 (r=-.254, p<.05). Copping pattern 1 is associated with Personal growth cluster, dimension Achievement (r=-.401, p<.01), as well as coping pattern 3 (r=-.409, p<.01).

Coping pattern 1 and coping pattern 3 are significantly associated with System maintenance cluster, both dimension on System maintenance – Organization and Control.

Table 8 *Parental and family demographic information and parental coping patterns*

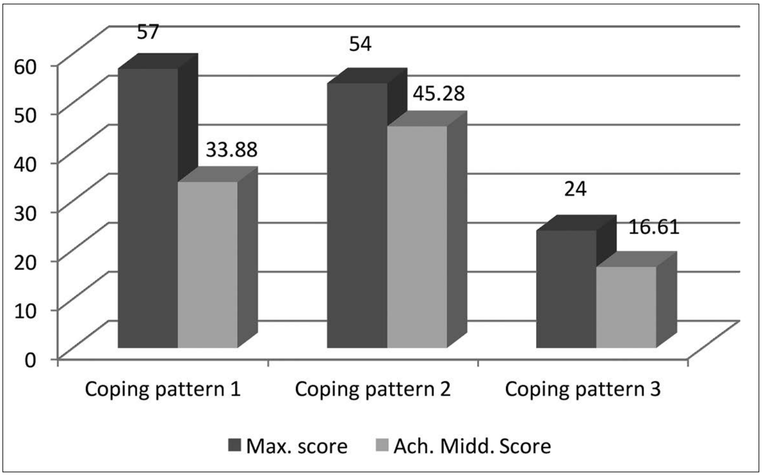
	Parental coping patterns		
Demographic characteristics	Coping pattern 1	Coping pattern 2	Coping pattern 3
Parental marital status	-,071 ,589	-,085 ,520	-,154 ,239
Father's age	,146 ,266	,097 ,459	,074 ,575
Mother's age	,188 ,150	,168 ,201	,063 ,635
Number of children	-,032 ,808	,114 ,387	-,095 ,470
Father's education	,110 ,403	,196 ,134	,191 ,143
Mother's education	,103 ,433	,108 ,412	,087 ,511
Father's employment	-,072 ,584	,224 ,086	-,013 ,921
Mother's employment	,083 ,530	,143 ,277	,128 ,331

Result showed no significant association between parental demographic characteristics and parental coping patterns.



Graph 1 Results distribution on some specific items on Coping health inventory for parents variable

Results showed no significant association between four specific items on Coping health inventory related to making closer and stronger bond with spouse, as a part of coping pattern 1 (F=2,06, df=2, p=.137). The graph 1. shows the most interesting outcome – the highest score on these items showed parents of child with severe cerebral palsy. This fact has practical implication and open field for intervention of professionals.



Graph 2 Maximal and achieved middle score on Coping health inventory for parents

The graph 2. shows achieved middle scores in the Coping health inventory for parents. Coping pattern 2, maintaining social support, self-esteem and psychological stability, shows highest score uses in our sample as a way to overcome stress and adapt. Right behind it is Coping pattern 3, where parents choose understanding medical situation through communication with other parents and consultation with medical stuff. Coping pattern 1, maintaining family integration, cooperation and an optimistic definition of a situation, shows the lowest middle score.

DISCUSSION

The results suggested that marital relations are most vulnerable and dysfunctional in families of children with the severe cerebral palsy. Increasing demands of caring, nurturing, complicated medical procedures from birth are the reason for this. Family strength resources are empting fast and if existing marital relations were not on a healthy basis, new circumstances easily lead to dysfunctions and to crisis. Results indicated no significant difference of marital relation quality associated with intellectual status of the child. There is also no significant difference in marriage satisfaction between the experimental and control groups. This fact confirms the premise of theorists that dysfunctional marital relations can be in the families with healthy child, as well as in families of children with cerebral palsy.

We have already stated that the essence of the family system is marriage. There is a reasonable assumption that child with disability has a devastating effect on the quality and stability of marital relations. There are number of various studies of parents of children with different types of disabilities, with same goal – make some practical implications. According to data from the early studies, in the seventies, percentage of divorce or separation of parents with disabled child, were three times higher than among parents of healthy children (Ferrari & Sussman, 2016). However, studies between the 80s and 90s of the last century, shows that the percentage of divorce is not higher than in a typical population (Starr, 1981; Waisbren, 1980). The focus of recent research has moved from the research point of marriages breakup to marital adjustment and efforts to overcome the problems caused by the birth of a child with disability. Kersh et al., (2006) in his study on 67 families, emphasizes the importance of the quality of marital relations for the overall well-being and prosperity of both parents and children with disabilities. Murphy's research of marital relations (2007), implicates that only 10% of the sample of 40 parent's marriage crisis ended by divorce. However, Cheshire et al. (2010), study on 70 parents of children with cerebral palsy, emphasize an important practical implications. Group of parents with cerebral palsy child in compare with group of parents with healthy children, has significantly poorer psychosocial stability, life satisfaction, and there is a high level of depression and anxiety. We believe that this information is more important than the number of divorces. Parents of children with cerebral palsy,were in marriage or not, have poor quality of life and reduced capacity for change. This fact should be a long-term priority in the efforts of all available resources to provide adequate assistance to families.

Marital adjustment scale test does not contain items related to children; so we tried to highlight the results of the specific items on Coping health inventory for parents. Four items of inventory refer to the rapprochement with spouse, as a strategy for coping with stress and crisis: 1. Talk with spouse about personal feelings and concerns; 2. Confidence in the spouse to help in caring for a child with cerebral palsy; 3. Regular outs with a spouse; 4. Bonding more with their spouse. Results of the comparison between the groups were not statistically significant, but the scores say more than that. The highest score on these items (136) showed parents of children with severe cerebral palsy. When we compare the results that we get one, it seems to us that they are in conflict. However, this opens the field for the intervention of family therapists. Although the study results suggest dysfunctional marriage relation in families of children with severe cerebral palsy, the parents choose to become closer with spouse as a coping strategies and way to overcome crises.

Results on Coping health inventory for parents are not significant between the three groups of parents with mild, moderate and severe cerebral palsy. Results are no statistically significant between the parents of children who are functioning intellectually average and parents of children with intellectual disability.

We assumed that the coping patterns correlate with the indices of family environment scale. Coping patterns 1, 2 and 3 are associated with dimension Active-Recreational in Personal growth cluster, coping pattern 1 (r=-.387, p<.01), coping pattern 2 (r=-.310, p<.05) and coping pattern 3 (r=-.254, p<.05). Copping pattern 1 is associated with Personal growth cluster, dimension Achievement (r=-.401, p<.01), as well as coping pattern 3 (r=-.409, p<.01).

Coping pattern 1 and coping pattern 3 are significantly associated with System maintenance cluster, both dimension – Organization – coping pattern 1 (r=-. 351, p <.01) and coping pattern 3 (r=-392, p <.01) and Control – coping pattern 1 (r=-. 278, p <. 01) and coping pattern 3 (r=-. 314, p < .01).

The McCubbin et al., (1983) study explored ways of coping with stress in families of children with chronic disease, such as cystic fibrosis. The authors cited significant correlation results on the dimensions Cohesion (p <.01), Expression (p <.05) and Conflicts (p <.05), all within the cluster Interpersonal relationships, also on dimension Organization (p <.01) and the Control (p <.05), as part of the cluster System maintenance, while the cluster of Personal growth, showed no significant correlation.

There is no significant correlation between certain forms of coping and the demographic characteristic. In the similar study McCubbin et al. (1983), the authors state that there are significant correlation between the coping pattern 1 and coping pattern 3 and data concerning family income, and between coping pattern 3 and child's age.

As there is no statistically significant correlation between the parents of the three groups according to the severity of cerebral palsy on Coping health inventory for parents, so we have analyzed data according to the achieved scores. Scores are high and inclined to a maximum, which indicates an increased effort and commitment of the family system to overcome the crisis and maintain the balance.

Coping refers to a person's cognitive or behavioral efforts to manage the demands of a stressful situation (Lazarus, Folkman, 1984). Copping pattern 1, refers to a family integration, cooperation and optimistic definition of the situation. This pattern leads the family's progress in overcoming stress or crisis, but carries with it the threat of closure of the family. Families can stay close in the system, using the old models of functioning, not taking the crisis as an opportunity to redefine relationships and develop new relationships. Although changes are leading to a loss of balance within the system, it also leads to a progress in adaptation and new patterns of behavior, which should be applied to family system in order to carry on with life. Medium score noted on the Coping pattern 1 is the lowest in all three groups, which means that parents in our sample, least frequently resort to this way of coping with stress.

Coping pattern 2 refers to seeking social support, in terms of helping friends, and society as a whole, as well as strengthening individual psychological strength and stability. Achieved medium score showed that this coping pattern is the first choice in our sample. Based on the results, we conclude that parents have reduced individual capacity to overcome and adapt and for seeking social support. We have already emphasizes that the family, because of shame and sadness, close and do not have the strength nor the will to seek help from a friend or the relevant social institutions. On the other hand, the institutions must invest maximum effort to adequately informed parents about the possibilities it offers. Often, parents do not have any information where to go and whom to turn.

Coping pattern 3, which refers to information and cooperation with health services as well as close cooperation with families that have the same or similar problem, also shows high scores. This pattern requires the active involvement in the process of habilitation, to investigate ways the health care services can facilitate the daily care and child health care, in cooperation with professionals in the health sector. Our sample high scores on this subscale indicate a desire to be actively involved in medical care process and not transferring all responsibility on health care system, which often happens.

We have already mentioned the results of some studies that used this measuring instrument. Because of its reliability, it is often used in research. McCubbin, Huang (1989) conducted similar research. The purpose of this investigation was to examine the critical family strengths which contribute to the overall healthstatus and health improvement of children who have mild, moderate and severe cerebral palsy. The results are significant associate between coping pattern 1 and coping pattern 3 and parents of children with mild form of cerebral palsy. In the group of parents of children with severe cerebral palsy, there were no significance in using specific coping pattern, while in the group of parents with children with severe cerebral palsy significance was recorded on coping pattern 2. Badr & Azar (2010), examine parents of children with intellectual disabilities. Primary coping pattern was 1 (family integration and cooperation), then coping pattern 2 (individual psychological strength and stability), and at the end coping pattern 3 (health professionals). Interesting research of Cavallo et al., (2008) demonstrated the correlation between level of child disability and parents coping patterns. Most parents in this study used a coping pattern 2, as well as in our sample, while only parents of children with severe disability rated as the most useful coping pattern 3.

Brittner et al. (2003), reported a significant difference in the amount and type of stress between the group of parents of children with cerebral palsy and a group of parents with healthy children. The functioning of the family, in general, did not depend on the child’s diagnosis. Parents of children with cerebral palsy declare need for individual professional experts support, considering it as insufficient or inadequate. Between the two groups of parents, found more similarities than differences in family functioning. Professional support in the wider social level is refer as an important factor of functioning between the child and maternal depression in the study of Manuel et al. (2003). It is important to emphasize that we should not underestimate the coping mechanisms that family already has. Signs of family stress can be reduced with productive mechanisms of coping, with permanent social and family support, a good self-assessment and the various services support (Brehaut et al. 2004). In the research of Lin (2000), coping strategies that parents of children with cerebral palsy state in more than 65% of the sample, are family and friends support, spiritual orientation, personal growth and transmission of positive social interaction.

The practical implications of this research are clear in terms of the attitude that expert help is needed in communication between family members, strengthen the power of individual family members, which contributes to the strengthening of family resources and wider, general progress of the child. In order to optimize the efforts of parents in their coping strategies, it is necessary to organize trainings for parents to improve communication skills, especially if we consider parental education and social framework from which some parents come. It is necessary to organize longitudinal studies to identify the pattern that provides the best results.

CONCLUSION

Marital relations in parents of child with cerebral palsy are significant different depends on severity of cerebral palsy. Parents of a child with mild cerebral palsy have better relations and better overcome a crisis. Results suggested significant difference in marital relations between parents of children with mild cerebral palsy and parents of children with severe cerebral palsy ($p < .01$), as well as parents of children with moderate cerebral palsy compared to parents of children with a severe cerebral palsy ($p < .05$). There is no significant difference between parents according to child intellectual status.

Results on Coping health inventory for parents indicates that parents often resort to coping pattern 2, which refers to maintaining social support, self-esteem, and psychological stability, then the coping pattern 3, related to communication with health care professionals, as well as addressing other families with similar problems. Coping pattern 1 relating to family integration, cooperation and optimistic definition of the situation, shows the lowest middle score. Results on Coping health inventory correlates with four indices of Family environment scale.

The quality of interpersonal relationships and a strong support system plays a key role in the quality of life of children with cerebral palsy. To provide support to children, various professional experts have to provide support to family members and encourage them to be strong, because of the children who need help. Advocacy in family and friends' interaction, family involvement in the planning and encouraging socialization, can significantly improve the emotional and social well- being of families with children with cerebral palsy (Davis et al., 2008).

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THE INFLUENCE OF ALCOHOL AND DRUGS ON THE VIOLENT BEHAVIOUR OF FOOTBALL FANS IN SERBIA

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SUMMARY

The aim of the survey was to determine whether football club fans in Serbia misuse alcohol and drugs and how that affects the manifestation of violence and growth of criminal career. The survey was conducted by using the polling method, with a questionnaire containing 33 questions, on a sample of 268 fans.The survey was conducted on territory of Belgrade, including fans of football clubs: "Crvena zvezda", "Partizan" and "Rad". The official documents of The Ministry of Interior were used as well.The survey results clearly indicate that abusing of alcohol and drugs is a powerful accompanying element of fan groups, and that a link between consumption of alcohol and drugs and violence on sport events exists. The paper emphasizes the social importance in developing prevention programs for young population visiting football matches. Massive scale of fan gatherings makes them too serious events to be left to criminal prone people who manipulate the youth, influence the development of their personality, and steer their future in direction of violence and criminal.

Key words: sport, fan groups, violence, criminal, drugs, alcohol

INTRODUCTION

Conducting research of extreme fan groups is difficult, especially due to the fact that these are quite closed groups with their own specific subculture and value system, a clear hierarchy and, in our conditions, with frequent poly-criminal activity of the fan leaders and members of the group core. Considering the fact that their behaviour is illegal, potential subjects are, generally, not willing to cooperate with the researchers. With due respect to some exceptions who are willing to cooperate, the researchers mainly turn to using data from the archives of conversations with group members with a long history of violent behaviour. Few researchers interview participants and eyewitnesses of the events/riots, perform field research or field and lab experiments. Furthermore, in criminological literature there are many papers that deal with violence in sport, especially football, but it is often emphasized that they include little research that deal with topics directly related to events in sport and topics related to sport such as connection between fan groups and organized narco-crime, juvenile delinquency, alcohol, etc. (Spaaij, 2008:375). This paper will shed light to the connection between organized fan groups and drug traficking and consumption, as well as the influence of alcohol on the violent behavior of extreme fan groups, which has been sidelined in criminological research, while in certain papers it is mentioned only without any deeper analysis.

The mentality of fans is as old as the existence of sports researchers and it has not undergone any significant changes since antic days, with its main characteristics being: violence, forming "fan tribes" with a clear hierarchy and iconography. From the psychological and sociological point of view it is especially interesting to analyse appointing notorious criminals as the leaders of fan groups (Muzur, Rinčić, 2011:147). With regard to this we should mention the results of a research conducted in 2012 in Serbia which dealt with the analysis of the data on 30 fan group leaders registered in the files of Serbian Ministry of Interior. The research established that the average age of fan group leaders is 28, 96. By analysing the criminal career of the respondents it is determined that the police filed criminal charges against 30 fan group leaders who committed 279 criminal acts. This means that, on average, one fan group leader committed 9,3 criminal acts over the period of 8,52 years, which is, at the same time, the average duration of their criminal career[a] (Simonović et al., 2014:112). If we add the fact that almost every fan group leader from the studies' sample committed their first criminal act as minors, this imposes a rightful conclusion that there is a strong connection between juvenile delinquency and recidivism, thus the criminality of juveniles in a society significantly determines their criminality in the future.

The appearance of violent behaviour in fan groups is temporally and spatially universal, though it shows significant oscillations depending on the culture, social satisfaction and politics. If we take into consideration that these factors also encourage violent behaviour it can be said that the fan violence is a geyser spurred on by psycho-biological factors, while the social aspect releases the flow. Sports connected to fan violence are usually the ones that implicitly involve mass audience, therefore all attributes of mass psychologies are implied, including the release of tension, absence of speech as main opposing force to violence, etc.

Even though there are numerous papers, studies and researches that cover football hooliganism in various aspects, some of which are mentioned in the introduction of this paper, there are many neglected aspects which are significant for understanding the origin and dynamics of violent acts on football matches. For example, one of them is the research conducted by Ayres and Treadwell (2012) according to which fans of some English clubs have a practice of consuming cocaine and alcohol while planning violent acts before the game in order to boost the aggressiveness, stimulate concentration and reduce fear (Ayres, Treadwell, 2012:99). With regard to this question we have published an interview with criminal investigators in Serbia who observe extreme fans and we found out that Serbian hooligans do not consume cocaine due to its price, but they combine heroine and certain synthetic drugs, most frequently marihuana with alcohol with the same aims as English fans. Nevertheless we find that certain studies rightfully point out that alcohol is not always the cause of hooligan and violent behavior. Some

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[a] Complex phenomenon of criminal career can simply be determined as committing a great number of criminal deeds by the same person over a long period of time. Significant objective elements of criminal career are: existing criminal activity and its time dimension, which means that the criminal activity is connected to a certain period of time of the perpetrator and has its beginning, duration and end. Subjectively, the perpetrators with criminal career identify with the crime, build a concept of themselves as criminals and accept crime as a way of life. Blumstein, A., Cochen, J: Karakteristike kriminalnih karijera: (Ignjatović, 2009: 460-463)

hooligan groups, such as "ICF" ("Inter City Firm"), West Ham fans, are against consuming alcohol because they want to be completely sober in case of a fight (Dunning, Murphy, Williams, 1988:15). In any case the claim that consuming alcohol and psychoactive substances is one of the main causes of violent behaviour of extreme fans is wrong. Such claims represent an attempt to find a unique explanation of this phenomenon, but also the tendency to transfer public and collective responsibility to individuals.

METHODOLOGY

The aim of the research was to establish to what extent football club fans in Belgrade consume alcohol and drugs and whether there are differences depending on their status within the fan group. The research applied several scientific methods for data collection and processing. In data collection the methods used were *questionnaires* and *content analysis* of certain written resources. The research was conducted using a *survey* with a questionnaire of 33 questions used as an instrument. The questions were structured into two parts: the first group of 15 question refers to *basic data about the respondent*, while the other set of 17 questions refers to *the relationship of the respondent towards the club whose fan group he belongs to*. Finally, the last, 33rd question was an open question which left the possibility to the respondents to point out, if they wish, anything that they consider significant for the research topic, in case it was not covered by previous questions.

Certain basic socio-demographic characteristics of fans were analysed for the needs of this paper, most important of which was: Do you use drugs or alcohol, or both, or none of the above? These results were cross-examined with the data from the other group of questions, within which the most important question was: What is your status in the fan group and have you ever participated in fan riots?

The survey was conducted in four stages which corresponded with spring and autumn parts of the football championship in Serbia, on a sample of 268 fans. The survey included fan groups of three football clubs with headquarters and stadiums in Belgrade: FC "Crvena Zvezda", FC "Partizan", and FC "Rad". The fans were interviewed in typical situations of performing fan rituals, on the stadiums of mentioned clubs.

We find that such volume and structure of the sample fulfill all the demands of representativeness, as 268 fans is almost 10% of the total number of registered violent and potentially violent fans in Belgrade, where 3000 such fans are registered (Otašević, 2015: 161). However, we consider this sample suitable despite the fact that the survey included only the fans who were available and who were willing to be questioned, because valid conclusions can be drawn from this survey.

In typical situations of performing fan rituals, establishing trust between extreme fans and researchers and the safety of surveyors were priorities set above higher levels of scientific research. This involved avoiding numerous delicate or particularly detailed questions in the survey. In research on extreme fans in Serbia we faced similar problems met by other researchers in this field: "Potential respondents are usually reserved or not willing to cooperate with the researchers. As a rule, interviews and surveys are conducted with the members of the fan groups who have a history of violent behaviour, which represents a problem for the researcher" (Russell, 2004).

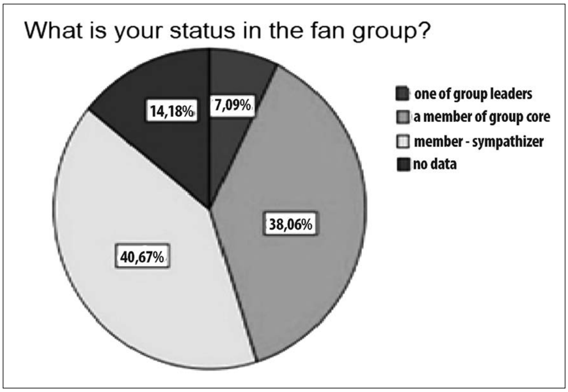
Fan groups of FC "Crvena zvezda" and FC "Partizan" were chosen as fan groups which have the greatest number of sympathizers and registered extreme fans, while the fan group of FC "Rad" was chosen as the most closed fan group, whose fans are especially prone to expressing violence towards the police and other fan groups. In order to establish the conditional heterogeneity of the sample, the subjects of the analysis were the role of the respondents within the fan groups (group leader, member of the group core or member-sympathizer and a fan who is not actively engaged in the fan group) and socio-demographic characteristics of the fans.

Content analysis of state authorities' documents (periodic reports of The Ministry of Interior of the Republic of Serbia for 2010, 2011, 2012, 2013, and 2014) was conducted as well as*content analysis of scientific articles* published in relevant scientific journals.

Standard informatics software was used in data processing. During 2012 data was entered into a previously prepared matrix in a typical spreadsheet format. The prepared data were then analysed with a standard software package IBM SPSS Advanced Statistics 20.0. Considering the type of data from the questionnaire the data processing procedure included using available statistical techniques of descriptive statistics: chi-square test and establishing correlation between variables through contingency coefficient.

THE RESULTS OF THE RESEARCH

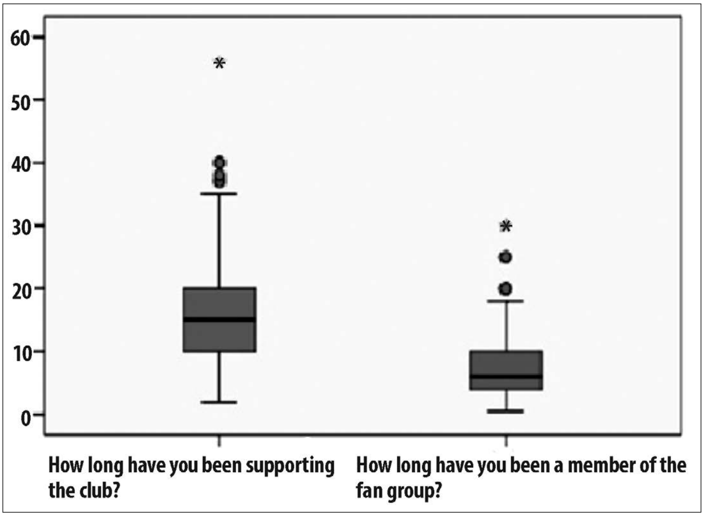
The biggest number of respondents in a fan group were sympathizers (40,67%) while there is a slightly smaller share of members of fan group core (38,06%). Only 7,09% of the respondents are group leaders, while 14,18% did not give any data on their status (Graph 1).



Graph 1 Distribution of respondents according to their status in the group

The results of this research which will, further in this paper, be elaborated in detail have undoubtedly shown that fan groups have a clear structure and hierarchy. In addition, when it comes to heterogeneity of the fan population, based on the findings of this research we could speak about the leaders and members of group core as one category and members-sympathizers as another category, rather than emphasize the importance of group leaders over everyone else.

Half of the respondents have been supporting their club for the last 10 to 20 years, whereas they have been members of the fan group for the last 4 to 10 years. Only 4 respondents have been supporting the club for an extremely long period, 3 of whom are active members of the fan group (Graph 2).



Graph 2 Distribution of respondents according to the period of supporting the club and the membership period in the fan group

The results of linear regressive analysis in Table 1 have shown statistically significant connection between the period of supporting the club and living standard (p<0,05), as well as the connection between the first game attended and parents fans (p<0,001) on one hand and birthplace and living standard (p<0,05) on the other hand. The data about whether parents are married or not did not affect any of the analysed parameters.

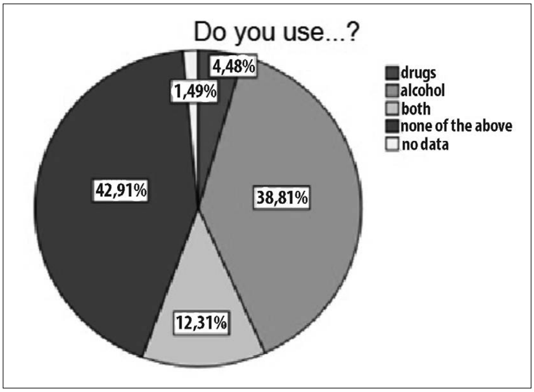
Table 1 *Distribution of respondents based on the influence of socio-economic factors, period of supporting the club and the first attendance of a football match*

	Years supporting the club		First attendance	
	Beta	Significance	Beta	Significance
Birth place	-0,098	0,192	0,145	**0,021**
Married parents	-0,022	0,768	-0,076	0,224
Living standard	-0,161	**0,033**	-0,135	**0,031**
Parents fans	-0,132	0,078	-0,267	**0,000**

The average results of the first attendance of the football match for the respondents from Belgrade was on average at the age of 11,23 ± 4,191, and for those from other places in Serbia 14,01 ± 3,754, while it was at the age of 9, 33 ± 4,755 for those born in another country. Respondents born in other towns in Serbia have attended their first football match significantly later than the respondents from Belgrade (t=4,859; p=0,000) or the ones born in another country (t=3,861; p=0,000). With the improvement of living standard, the length of the period of supporting the club decreases and it also lowers the age at which first game is attended, but these factors are not statistically significant.

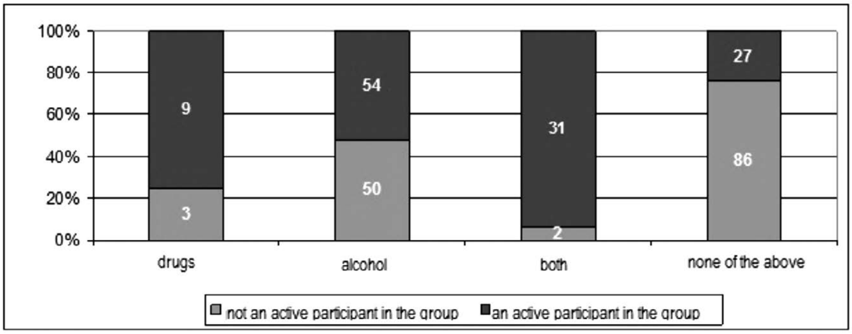
Respondents whose parents support a club went to their first match at the age of 10,50 ± 4,323 on average, and those whose parents do not support any clubs went to their first match at the age of 13,11 ± 4,076 on average. This difference is statistically significant (t=4,796; p=0,000).

One of their significant features is related to alcohol and drug use, among other things. Most respondents claimed that they do not use alcohol or drugs (42,91%). 38,81% of them use only alcohol, 4, 48% use only drugs, while 12,31 % use both alcohol and drugs (Graph 3).



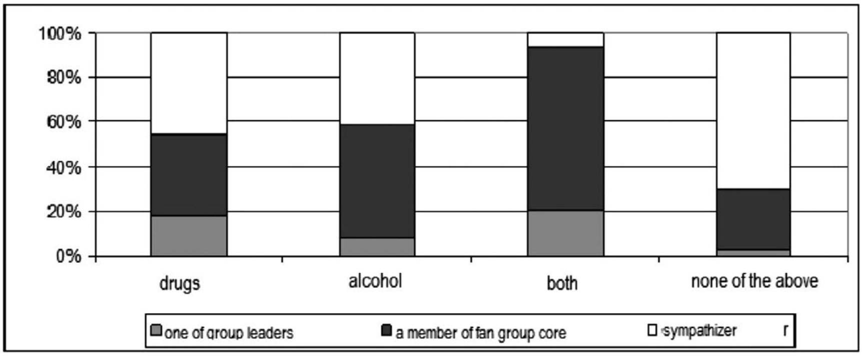
Graph 3 Distribution of respondents based on drugs and alcohol consumption

Fans who use drugs actively participate in the group three times more (75%), than those who do not (25%). Out of 104 fans using only alcohol 50 (48,1%) do not actively participate in the group, and 54 (51,9%) do. Almost all the fans (93,9%) who use both drugs and alcohol are active participants in the group, while less than one quarter (23,5%) of those who do not use either drugs or alcohol are active participants (Graph 4).



Graph 4 Participation of fans based on the use of alcohol and drugs

From Graph 5 it can be observed that respondents who use drugs and alcohol mostly represent the core of the fan group (72,7%). 93,9% of the fans using drugs and alcohol are either group leaders or members of the core, while only 6,1% of them are only members-sympathizers. At the same time, in the category of those not using drugs and alcohol, members-sympathizers make 69,6%, while 27,2% make the core of the group and 3,3% are group leaders.



Graph 5 Distribution of the respondents according to their status in the fan group depending on the drugs and alcohol use.

In the sub-group of respondents who claimed that they do not use either drugs or alcohol, there is only 3% of them who are group leaders, 27% are members of the group core and 70% of them claimed to be members-sympathizers.

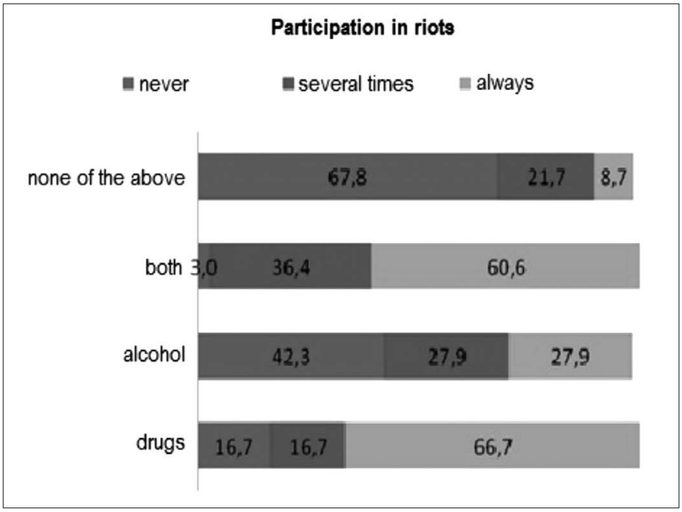
We can also observe, if we look at the results of logistic regression analysis in Table 2, that membership in fan groups is most tightly connected to alcohol and drug consumption (OR=0,494; p=0,001; 95% CI 0,322-0,758), and it is followed by the fans' employment (OR=1,813; p=0,031; 95% CI 0,055-3,114), and whether the parents are married (OR=1,854; p=0,045; 95% CI 1,013-3,395). Place of birth, school attendance and playing sports are the least influential parameters.

Table 2 *Distribution of respondents according to the influence of some socio-economic factors on the role of fans within a fan group*

			95% CI	
	OR	p	LB	UB
Place of birth	0,953	0,886	0,494	1,840
Place of living (town/village)	0,902	0,735	0,497	1,638
Finished school	0,706	0,249	0,390	1,276
Attending school now	0,967	0,876	0,633	1,477
Full time student-part-time student	2,778	0,172	0,642	12,016
Playing sports	0,927	0,882	0,340	2,527
Religious or not	0,867	0,633	0,483	1,557
Employment	1,813	**0,031**	1,055	3,114
Living standard	0,970	0,941	0,429	2,194
Living with	1,367	0,287	0,769	2,430
Parents married	1,854	**0,045**	1,013	3,395
Marital status	2,073	0,224	0,641	6,702
Using drugs and alcohol	0,494	**0,001**	0,322	0,758

CI- Confidence interval; LB- lowerbound; UB- upper bound; p- significance

From Graph 6 we can observe that most of the fans participating in riots use drugs (66,7%), or drugs and alcohol (60,6%) while most of those who do not use drugs and alcohol never participate in riots (67,8%).



Graph 6 Participation in riots in relation to drugs and alcohol use

DISCUSSION

The results of this research have undoubtedly shown that there is a clearly expressed hierarchy within fan groups in Serbia, and it consists of three structural elements: group leader, group core and members-sympathizers, and according to some authors, there is also the fourth element which is the most interesting from the aspect of safety- the persons who hire football fans to do illegal acts (Nikolić, 2012; Otašević, 2015). In criminological literature it is very often pointed out that minors and young adults are locally organized on racial and ethnical basis and they tend to join the groups based on the principles such as military hierarchy, obedience and submission. The youth belonging to a group are more aggressive and ready to provoke the riots and violence than their peers who are not involved in any group. Some Italian authors have written about paramilitary and territorial way of organizing ultras fans (Roversi, Balestri, 2000:191). As our research has shown, extreme football fan groups and sub-groups in Serbia are also characterized by military-like hierarchy and territorial organization.

Professional football, which is a legal activity, represents the centre which attracts many people with different interests and both legal and illegal activities. In football, legal and criminal activities are frequently intertwined and mutually conditional. Football clubs which are legal institutions often serve as a cover for various illegal activities, such as: trade of players, match fixing, money laundering, corruption and narco crime (Felson, 2006:17). Violence of football fans is just one of the visible manifestations of criminal behaviour. However, behind it, in its shadow, there are many other, less visible criminal acts, such as football fans' fights, caused by reasons other than club loyalty;

manipulation of fans with the purpose of reaching political goals; drug trafficking, fighting for drug market etc.

Precisely in these structures main actors are fan leaders and persons who hire fans to do illegal actions as representatives of criminal potential. Besides sports-related crime they organize other criminal activities, using, in a very cunning way, other members of fan groups. The basic driving motives are economic in their nature. The tendency for domination and control over a fan group has, above all, the aim of making profit.

The results of the survey where 50% of respondents have been supporting their club for the last 10 to 20 years, and they have been members of a fan group for 4 to 10 years, show that fans' subculture has been a specific youth phenomenon in the last decades on the territory of former Yugoslavia. Similar results were obtained in a survey conducted in Croatia, where almost half of respondents 47,2 % of the fan group Torcida from Split (FC Hajduk) stated that they had been members of the fan group for six or more years (Lalić, 1993:120). The results of the survey with the respondents born in Belgrade show that they went to the first match at the age of eleven, while those whose parents were fans went at the age of ten. Respondents born in other towns in Serbia went to the first match at the age of fourteen, which indicates that the subculture of fans is an urban phenomenon and, most often, a problem of big cities. Inability to provide for basic living conditions, unemployment, "challenges of the big city", social atmosphere which is not supportive of the creativity of individuals and, finally, boredom, lead to the situation that unfilled leisure time is one of the possible preconditions for violent behaviour (Otašević, 2015:176).

An important characteristic of extreme fans refers, among other things, to consuming alcohol and narcotics. It is surprising that the relationship between football fans and consumption of alcohol and drugs has been completely neglected in researches so far. Only one paper considers the problem of consuming drugs and alcohol before football matches with the aim of increasing aggressiveness and overcoming fear, which has been identified in some categories of extreme football fans (Ayres, Treadwell, 2012:99). Simultaneous consumption of alcohol and various kinds of drugs, especially synthetic ones when it comes to our country, increases the popularity of certain extreme fans within a group. The most worrying is the fact that alcohol is intentionally consumed in combination with various kinds of drugs with the aim of provoking future violent behaviour. This combination of various kinds of opiates consumedleads to expressing extreme violent behaviour, delayed self-control time and strengthening of male identity, which is, at the same time, a lifestyle of majority of extreme fans in our country.

The results of our research undoubtedly confirm the connection between alcohol and narcotics consumption and membership in fan groups. According to these results majority of respondents (42, 91 %) do not use alcohol or drugs, – 38, 81% use alcohol, 4, 48% use drugs, and 12, 31% of respondents use both. Fans using drugs actively participate in fan groups three times more (75%) when compared to those who do not participate (25%). Out of 104 fans who use alcohol, 50 (48,1%) do not actively participate in the fan group, and 54 (51,9%) are active participants. Almost all fans (93,9%) that use both drugs and alcohol actively participate in fan groups. Out of the fans that do not use drugs or alcohol less than a quarter (23,5%) actively participate as members of some fan group.

However, in a country with the growing number of unemployed people and people consuming various psychoactive substances, a reasonable question occurs – whether violent sports fans are significantly different from their peers. This is certainly a very interesting question which could be the basis for some comprehensive sociological and criminological studies. The above data confirm the connection between consuming alcohol and/or drugs, poverty, lack of perspective and football hooliganism. Sometimes hooligans are persons from broken families, dissatisfied with their social status and often cannot see perspective in the future, and thus easily take the wrong way searching for their identity in violent and criminal milieu. They are especially characterized by strong impulsiveness, strong feeling of identity in the group, as well as by the feelings of belonging and importance.

Unemployment, broken families, consuming alcohol and drugs are some of the dominant characteristics in the structure of fan groups. However, one should not rush into making generalized conclusions, because there are always exceptions which break all rules in the analysis of violence at sports events. We have already mentioned the example of the hooligan group "ICF" ("Inter City Firm") supporting "West Ham", who strongly oppose consuming alcohol before and during football matches, because they want to be completely sober in case of fights (Dunning, et al. 1986:15).

According to the results of our research, little less than a half of respondents – 47,01% has never participated in fan riots. The percentage of those who have participated in riots several times – 26,12%, and those who always participate – 25,37% is almost the same. The variable which represents participation in fan riots was interrelated with consumption of drugs and/or alcohol. All identified correlations are statistically significant on the level of 0,01 and state that riots participants are mainly those who use drugs – 66,7%, or those who use both drugs and alcohol – 60,6%, while the ones who do not use drugs or alcohol mainly never participate in fan riots – 67,8%. These results may be confirmed by the results of the survey conducted in 2014 in high schools in Serbia. It should be emphasized that the respondents who declared themselves members of a fan group, and who consumed drugs and/or alcohol, were more often arrested at sports events, they were more often filed with offence and criminal charges for violence at sports events, and they were more often convicted of violence at sports events. Therefore, it can be concluded that there is a connection between consuming narcotics and violence at sports events (Milojević et al., 2014:325). Having this in mind, it is necessary to implement adequate preventive programmes, especially among school children population, taking into consideration that with juveniles who commit criminal acts of illegal drugs possession, the criminal act is mainly the result of imprudence, identity and emotional crisis in personality development. Most often it is not a consequence of upbringing or educational negligence (Soković, 2013:30). Developing narcotics and alcohol addiction, and especially simultaneous consumption of alcohol and various narcotics increases the risk of future violent and criminal behaviour of extreme fans. Hence, the understanding and timely recognition of the risk factors, as different categories of juvenile delinquency, is essential, since only adequate social reaction can, on one hand, successfully prevent future serious criminal careers and, on the other hand, while avoiding stigmatization, find adequate criminal and legal reaction to criminal episodes of juvenile delinquency (Soković, 2013:37).

As it has been stated several times so far, extreme fans' consumption of alcohol implies their extreme aggressive behaviour. Due to this, during the European football championship in France this year, the shops and supermarkets were not allowed to sell alcohol to fans during the championship. The authorities there have also banned selling alcohol in the vicinity of fan zones and other "sensitive areas" where clashes might occur. French officials made such a decision following the riots and clashes between Russian and English fans in Marseille on the first day of the Championship.

Alcohol is one of the most common explanations for the violence taking place at sports events in Europe. Therefore many European countries have undertaken preventive measures for limiting the sale of alcoholic beverages near sports venues and prohibition of consuming alcohol at sports events. The basis of these measures is to be found in the European Convention on Spectator Violence and Misbehaviour at Sports Events and in particular at Football Matches[b]. The convention stipulates numerous preventive measures which should be adopted and implemented by the states which are signatory parties in order to prevent violence and misbehaviour of spectators. Majority of measures are set forth in the article 3, stating that signatory parties undertake to ensure the formulation and implementation of measures designed to prevent violence and misbehaviour of spectators and: a) to exclude already known and potential offenders, or people who are under the influence of alcohol or drugs from or forbid access to matches and stadiums; b) to prohibit bringing of alcoholic drinks into stadiums; and preferably to ban the sale and any distribution of alcoholic drinks at stadiums, and to ensure that all beverages available are distributed in safe containers.

England is the first of European countries which started a severe fight against violence at sports events and it is still enacting new and improving the existing legal regulations. Thus, according to Football Disorder Act 2000 acts of entering or trying to enter sports premises when under the influence of alcohol are considered offences. This act can be committed in the period defined by the law as the period relevant to the football match and at any part of sports premises while the accused was at, or was entering or leaving or trying to enter or leave the premises. According to this Act offences also include behaviours when persons are found drunk or have committed any other offence under the influence of alcohol while on the way, on coaches or trains to or from sporting events, or in any other public place while on a journey to or from a football match[c].

The Law on Violence and Misbehaviour Prevention at Sports Events of the Republic of Serbia[d] contains similar provisions: Article 18 prohibits the sale or consumption of alcoholic beverages at sports premises as well as within the distance of one kilometre

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[b] European Convention on Spectator Violence and Misbehaviour at Sports Events and in particular at Football Matches was adopted by the Council of Europe on 19 August 1985 in Strasbourg and represented the reaction of European countries to the Heysel Stadium disaster in Belgium. The convention was ratified by our country in 1990.

[c] Taken from: http://www.legislation.gov.uk/ukpga/2000/25/contents, on 28/09/2014

[d] Law on Violence and Misbehaviour Prevention at Sports Events, "Official Gazette of the RS", no. 67/03, 101/05, 90/07, 111/09, 104/13.

from the premises in Belgrade, Kragujevac, Niš and Novi Sad, and in other towns within 300 meters from the premises during the time of sports events. This provision is regularly applied.

For instance, such prohibition measures do not exist in North America. Alcoholic beverages can be bought at hockey matches, but there is significantly less violence at sports events than in European countries, which could be explained primarily by cultural differences. Clubs in North America are generally owned by rich people so the relationship between fans and club owners in hockey has never been strong. As opposed to that, in most of European countries fans consider that they are a part of the club, and the connections and interests of club owners and extreme fans are intertwined to a great extent. On the other hand, typical visitors of sports events in North America are members of the middle class, with university education and almost half of them are women. A research conducted in Toronto has shown that 45% of spectators on hockey games are women with the average income, which is middle class national average. Almost half of spectators are employed or company owners. An average spectator of hockey games in Canada is in his/her mid-thirties and quite far from the category of people prone to criminal or violent behaviour. It can thus be concluded that the fan structure is essentially different from the ones in Europe (Julian, Benjamin, 2000:167). According to police records in Europe majority of fans who commit violence are under the age of 20.

The biggest share of respondents who consume both drugs and alcohol are members of the fan group core. Up to 93,9% of fans who use both drugs and alcohol are either fan leaders or members of the fan group core. Only 6,1% are sympathizer members. Out of the respondents who do not use drugs and alcohol, only 3% are fan leaders and 27% are members the fan group core, while 70% declared themselves sympathizer members. Football fans can, undoubtedly, be a good target group for drugs distribution. On the other hand, taking into consideration that there is an organization, hierarchical structure and criminal potential of football fan leaders it is easy to recruit future drug dealers among fan group members. These results are supported by the findings of the already mentioned research from 2012. Analyzing the records of 30 registered fan leaders in Serbia it has been established that 12 of them appear to have committed offences related to drugs. The degree of their violent behaviour is also proven by the fact that fan leaders from the sample also committed three criminal acts of murder, and three of them have been killed (Simonović et al., 2014:117). Until the moment of writing this paper, these crimes have not been solved, and the media reported that the motives of these crimes were fights for dominance on the illicit drugs market. Actually, narco-crime is one of the most common ways of securing livelihood for fan group leaders. Also in a research conducted in Germany, analysing convicted persons who were registered in the Central Federal Criminal Register (BZR), it has been established that offenders coming from fan population belong to all age groups, and among them there is a considerable number of those who had been convicted of various criminal activities related to illicit drugs abuse (Albers et al., 2015: 489).

CONCLUSION

Consumption of alcohol and drugs is identified with excesses at sports events in Serbia. However we consider such claims to be an attempt to reach a unique explanation, and a tendency to transfer public and collective responsibility to individuals. In our mentality drunkenness is seen as a justification for such behaviour, which is why drunkenness is overemphasized. Examples from practice support the belief that spectators come to matches under certain influence of alcohol, and since recently also under the influence of various narcotic substances. However it cannot be claimed that alcohol is the cause of violent behaviour, though it is an important accompanying element. Riots at sports events are initiated precisely by drunken fans. They represent a specific safety problem after the end of sports events. When the audience leaves the stadium, they continue to commit offences and criminal acts in broader area of the stadium. Then the full responsibility for maintaining public order and peace rests with the police, which causes spending considerable financial and technical means and human resources. Our country is no exception in this respect because almost all European countries have adopted preventive measures for limiting the sale of alcoholic beverages in the vicinity of sports facilities and prohibition of consuming alcohol at sports events. The basis for introducing such measures was found in the European convention on spectator violence and misbehaviour at sports events, football matches in particular. Moreover, taking into consideration the fact that fans in our country are prone to criminal and violent behaviour, as well as the fact that poly-criminal activities are an important characteristic of fans' leaders in Serbia, it can be rightly concluded that extreme fans are a good target group not only for consuming drugs but also for street-level drug dealing.

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SELF-ASSESSMENT OF COMPETENCIES AND CONFIDENCE OF PROFESSIONALS WORKING WITH CHILDREN WITH DISABILITIES

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SUMMARY

Introduction: *Early intervention refers to a system of services that was designed to make better academic and social outcomes of low-income, academically at-risk preschool-age children; as well as the services given to children born with disabilities that impede normal development. A transdisciplinar team members are therapists, psychologists, social workers, physicians, pediatricians and all other professionals who work with children aged 0-5 years. One of the most important questions is how much these experts are competent and confident to provide the best possible service and support for children and families with whom they work.*

Goal: *The goal is to determine how the experts assess their level of competence in work with children with disabilities and how confident they are for their job.*

Material and methods: *To test the confidence and competence of experts, it was used a adapted questionnaire "Qualifications and competencies of professionals working with children with disabilities" (Original: "Competence & Confidence of Practitioners Working with Children with Disabilities"). The model was consisted of the professionals who work with children with disabilities aged 0 to 5 years. The evaluation included a questionnaire in printed and online version. For each question the respondent had to choose one of the answers.*

Results: *The results of self-assessment experts suggest a high level of competence and confidence during the work with children with disabilities within each of 7 items.*

Conclusion: *Experts have a high level of competence and confidence in work with children with disabilities.*

Key word: early intervention; children with disabilities, competence of practitioners, confidence of practitioners

INTRODUCTION

Early intervention is a series of procedures aimed at stimulating the overall development of children with neurodevelopmental risk factors and children with disabilities, as well as their families. The role of the early intervention program is to connect practitioners from varying backgrounds into a single team, formed around the needs of the child and their family – and thus enable a complete and efficient approach (Golubović, Slavković & Brkić Jovanović, 2015). Some children are born into families with high levels of risk for the manifestation of certain disabilities, while, in other cases, the families are unexpectedly forced to deal with the manifestation of the disability – meaning that they are unprepared (Valentine, Katz, 2015). Hence, an adequately qualified transdisciplinary team of practitioners is vital, as a support system for both the family and the team members, themselves (Golubović et al., 2015). An analysis of the shared features of the present, successfully established, programs of early intervention shows a manifold of common traits aside from a similar number of children in a single group and an encouraging environment. Namely, mutual confidence and open communication between the professionals and the family, as well as the employment of a highly qualified team of practitioners are the qualities present in each program (Golubović, Marković & Perović, 2015). Considering the importance of early intervention at such a young age, what becomes pivotal are the matters of competence and the capability of the practitioners to provide the children and the families with the utmost care and support (Cumming & Wong, 2011). The self-evaluation of one's performance is defined as the confidence that the professionals, as individuals, have in their own abilities to plan, organize and execute their activities with the child (Skaalvik & Skaalvik, 2007).

The analysis of the professional competence and the capabilities of the practitioners to work with younger children with disabilities is the subject of numerous studies (Chan, 2011; Holdheide, 2013; Holdheide, Goe, Croft & Reschly, 2010; Sharma, Shaukat & Furlonger, 2015). The efficiency of the professionals is the key component of special education programs. Accordingly, the processes of the rehabilitation and the training of disabled children demand thorough preparation and the training of the practitioners, in order to maximize their productivity and professional development, as well as to allow for a continued evaluation of their performance. What can be derived from this is that the education of the practitioners ought to be focused on the development of their skills and expertise – they need to both be aware of the needs of the children with disabilities and to be able to maintain the pace of the rapid changes and the accelerated development of their profession. The research in the form of qualitative and quantitative studies on the work of these experts with disabled children has generated a significant amount of attention, which has had a positive influence on the amelioration of the quality of the early intervention programs (Chan, 2001). Through various programs during their education, as well as through further training in their jobs, the practitioners develop abilities that aid them in satisfactorily meeting the demands of their profession and acquiring knowledge, all of which positively affects the quality of their work with disabled children (Hoogveld, Pass & Jochems, 2005). Alahmari (2010) has specified that a practitioner who works with disabled children ought to possess extensive knowledge of the following: training methods, the use of technology in education, early problem detection, the skill of efficient communication with disabled children, and test application (Alahmari, 2010). Although there may be a certain level of discord regarding the specific characteristics that the professionals should develop and the manner of their evaluation, Goe et al. (2008) highlight that the practitioners' abilities which influence the overall development of the child are the use of diverse methods in the assessment and the encouragement of the academic and social development of the child, the successful planning of programs dealing with the children and the collaboration with parents and other practitioners (Goe, Bell & Little, 2008). Earlier results derived from the self-evaluation of the practitioners, regarding the level of the development of the competence they acquire through education, showed that the grade 'medium' applies to the value of their competence for developing individualized education plans, making estimates and diagnoses, communicating with the families and using new technologies. However, the value of these qualities, in themselves, was graded as ‘highly important’ (Sheikh & Khleif, 2014). Other research has shown that the practitioners have neither the appropriate training nor the experience necessary for working with the disabled children (Avramidis, Bayliss, Burden, 2000; Burke & Sutherland, 2004) along with the fact that they – in general – manifest negative attitudes towards the concept of inclusive education (Daane, Latham, 2000; Lohrmann, Bambara, 2006); they are also constrained to the materials they usually use (Pisha & Stahl, 2005), which hampers their ability to use the new technologies that would ease their work. Across the globe, there are standards regarding the required qualifications of the practitioners that work with disabled children. To be specific, the implementation of the existing vocational and qualification standards would urge for professional training programs and professional licensure, in order to achieve the highest level of preparation for day-to-day work with children (Turner, 2003). Researchers believe that these programs ought to be focused mainly on improving the skills for cooperation with the other team members, the skills for developing education plans and the skills for the successful application of assistive technologies (Laarhoven, Munk, Lynch, Bosmal & Rouse, 2007). Nonetheless, there is little empirical evidence that would specify exactly what knowledge, skills and attitudes need to be improved within the programs (Loreman, Earle, Sharman & Forlin, 2007). In Serbia, despite there being an understanding of the indispensability of properly trained professionals, there are today neither training programs nor clear educational standards and certificates which would verify one’s competence for working with disabled children. The institutions that work with children who manifest neurodevelopmental risk factors and disabilities – aged 0-5 – and their parents, employ a plethora of experts from various backgrounds, all of who acquired their knowledge and skills through differing levels of formal training, informal training, individual efforts and personal motivation. All of these impact not only the degree of their competence for that line of work but also the amount of self-confidence they exhibit in everyday interrelation with the children and their families.

GOAL

The goal is to determine how the experts assess their level of competence in work with children with disabilities and how confident they are for their job.

MATERIALS AND METHODS

The research on the levels of competence and self-confidence of the practitioners was conducted through the means of an adapted survey, titled “Competence & Confidence of Practitioners Working with Children with Disabilities“, created by the Center to Inform Personnel Preparation Policy and Practice In Early Intervention & Preschool Education 2007, Study VII Data Report: Part C – Competence & Confidence of Practitioners Working with Children with Disabilities. The original survey consists of 47 items, while the adapted version has 37 items out of which 11 are aimed at collecting basic data, while the remaining 26 items were designed for the purpose of learning about the competence and confidence of the practitioners in 7 specific kinds of practices. These practices are: parent-practitioner collaboration, self-judgment, individualized educational plan development, instructional practice and teaching methods, natural environment and inclusion, cooperation and teaming, and, finally, learning at an early age. Within the survey, the 26 items are randomly distributed – 13 of which test competence while the remaining 13 test confidence. The items were each rated on a 7-point scale, the options being: never, seldom, sometimes, more often than not, often, frequently, all the time. The research conducted by the University of Connecticut in 2007 tests competence and confidence of the practitioners working with children with disabilities by the means of a factorial analysis. What was looked at, within each type of practice, were the components in relation to the competence and the confidence of the practitioners; these manifested a strong internal connection, seeing that Carmines Theta ranged between 0.6266 and 0.7952.

Sample

The sample for the research was comprised of 79 practitioners – members of various professions – all of who work with children with disabilities within early intervention programs.

Procedure

The research included practitioners who work with disabled children aged 0-5, within the early intervention programs, as above mentioned. The surveyed professionals each filled out a survey in a printed and an online version. The research was conducted in community health centers in Novi Sad and Belgrade, at the Institute for Health Protection of Children and Youth in Novi Sad, at the Development Counselling Center in Vršac and Sremska Mitrovica and at a preschool institution within "Milan Petrović" Primary and Secondary School for Special Education in Novi Sad. Every surveyed practitioner was expected to opt for one of the offered options that best fit the description of their work.

RESULTS

A Descriptive Analysis of the Sample

Within the tested sample of 79 practitioners, 6 were male (7.6%) and 73 were female (92.4%).

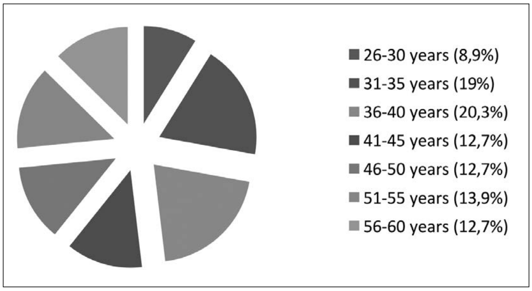

Chart 1 The Age Groups

The age of the surveyed individuals spanned from 26 to 60 years old. The majority was aged 36-40 (20.3%).

Most of the surveyed practitioners had a degree of higher education (university graduates) – precisely 58 (73.4%). There were 8 (10.1%) practitioners who held an associate's degree, 4 (5.1%) had a master's degree and 9 (11.4%) had a doctorate.

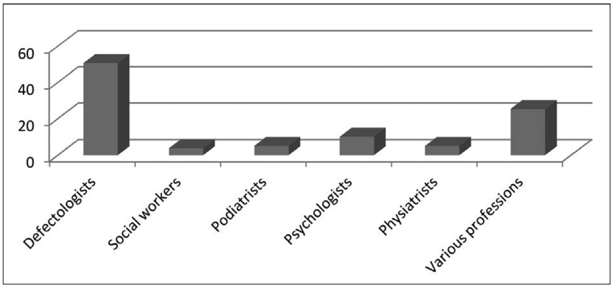

Chart 2 Distribution of practitioners in relation to their disciplines

Among the surveyed practitioners, the majority were defectologists (50.6%). Psychologists presented 10.1% of the sample, podiatrists 5.1%, physiatrists 3.8%, social workers 3.8%, while the remaining 25.3% were members of various professions (pedagogues – 7.6%, physiotherapists – 7.6%, and preschool teachers – 5.1%).

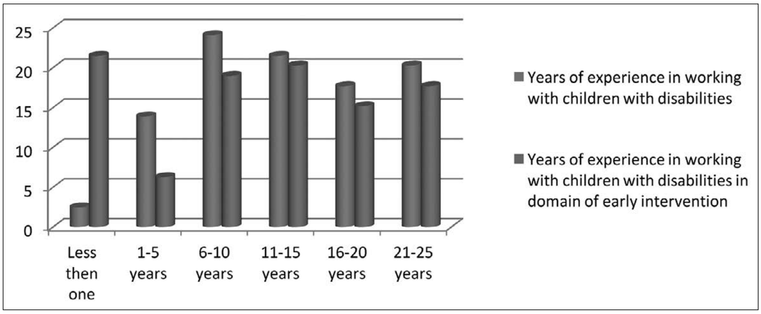

Chart 3 Years of Experience in Working with Children with Disabilities and Work Related to Early Intervention

The majority of the surveyed practitioners (24.1%) have 6-10 years of experience in working with children with disabilities. In terms of early intervention, this was the first year of work on jobs in that domain for most of the practitioners (21.5%).

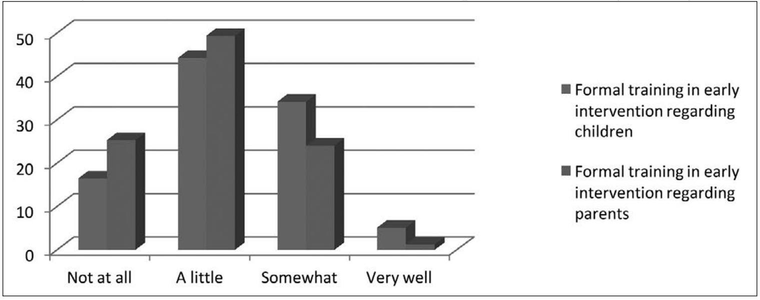

Chart 4 Formal Training in Early Intervention with Children and their Parents

The majority of the surveyed practitioners stated that they had had very little formal training in early intervention regarding children (44.3%) and their parents (49.4%).

When asked whether they needed certification in order to work in early intervention programs, 64 practitioners (81%) answered negatively, while 15 (19%) said that a certificate was necessary to work in their position.

Table 1 *The way of receiving inservice training*

Responses	Which of the following are the primary ways you receive inservice training?	Which of the inservice training approaches do you find most helpful in terms of improving your skills working with infants and toddlers with disabilities and their
	Number of the surveyed	Number of the surveyed
Lectures/Presentations	28 (35,4%)	24 (30,4 %)
Web Based Training/Instruction	13 (16,5%)	-
Full Day Workshops	7 (8,9%)	20 (25,3%)
College or University Courses	25 (31,6%)	27 (34,2%)
Attending Conferences	3 (3,8%)	-
On the Job Mentoring/Coaching	3 (3,8%)	5 (6,3 %)
Half Day Workshops	-	2 (2,5%)
DVD Based Training/Instruction	-	1 (1,3%)

The majority of the surveyed claimed that they acquired their knowledge about early intervention pre-service – by the means of presentations and lectures (35.4%) and university education (31.6%). These were also the approaches the practitioners considered as best for acquiring and developing skills in early intervention (see Table 1)

Analysis of the Answers in the Survey

The practitioners answered to 26 items that were randomly distributed. They were offered a scale of 7 possible answers, ranging from *never* to *all the time*. The testing of the reliability of the survey showed a value of α=0.93 (Cronbach's Alpha), which is demonstrative of a high degree of reliability and a high degree of internal coherence of the scale for this sample.

The following charts show questions related to the competence and the confidence of the practitioners, in seven kinds of practices: parent-practitioner collaboration, self-judgment, individualized education plan development, instructional practice and teaching methods, natural environment and inclusion, cooperation and teaming, and learning at an early age.

Table 2 *Family - Centered Practice*

	Items	1	2	3	4	5	6	7
Com	I am able to get the families I work with to obtain supports and resources on their own	-	-	3,8%	7,6%	40,5%	39,2%	8,9%
Com	Families recognize and use their strengths to improve child outcomes because of how I work with them	-	-	3,8%	12,7%	40,5%	36,7%	6,3%
Con	Getting families to talk to me about what is important for their children to accomplish comes easy to me	-	-	5,1%	10,1%	35,4%	38,0%	11,4%
Con	I am pretty sure that the families I work with will become more empowered because of my work with them	-	-	1,3%	5,1%	15,2%	44,3%	34,2%

Com- competence, Con- confidence, 1- Never, 2-Rarley, 3- Some of the time, 4- More often than not, 5- Most times, 6- Almost always, 7- All the time

The practitioners mostly consider themselves as competent in regards to the collaboration with the family of the child; they are also predominantly confident in their work (see Table 2).

Table 3 *Assessment and Evaluation*

	Items	1	2	3	4	5	6	7
Com	I am able to "hit the mark" every time in terms of identifying children's strengths and needs	-	-	2,5%	7,6%	39,2%	41,8%	8,9%
Com	I am especially proficient at helping parents identify their children's and families' needs and concerns	-	-	7,6%	8,9%	36,7%	40,5%	6,3%
Con	I am almost always certain that I will be able to identify and use children's personal interests to improve child learning	-	-	3,8%	12,7%	40,5%	26,6%	16,5%
Com	I feel sure that my assessments of children's capabilities are accurate	3,8%	19,0%	16,5	17,7%	19,0%	10,1%	13,9%

The practitioners consider themselves as frequently competent in regards to self-evaluation. They are mostly confident in their abilities to recognize a child's interest and to use that interest as a child-initiated learning opportunity. Their levels of confidence are somewhat lower when assessing the children's abilities (see Table 3).

Table 4 *Individual Family Service Plan*

	Items	1	2	3	4	5	6	7
Com	The children with whom I work achieve the majority of their IFSP outcomes in a period of year or less	-	-	-	3,8%	34,2%	50,6%	11,4%
Com	I am able to get the families I work with to be key players in identifying IFSP outcomes for their children and themselves	-	1,3%	3,8%	3,8%	27,8%	48,1%	15,2%
Con	Writing IFSP outcomes that are functional and meaningful child behavior is a breeze	-	-	6,3%	12,7%	43,0%	31,6%	6,3%
Con	It is easy for me to know which child and parent IFSP outcomes are most important to the families I work with	-	-	6,3%	13,9%	34,2%	41,8%	3,8%

The practitioners consider themselves as competent in regards to the development of individualized education plans (see Table 4).

Table 5 *Instructional Practices*

	Items	1	2	3	4	5	6	7
Com	Because of my efforts, parents and other caregivers are better able to use responsive instructional practices with their children	-	-	2,5%	8,9%	39,2%	41,8%	7,6%
Com	My efforts getting parents and other caregivers to promote child engagement with people and objects are very successful	-	-	5,1%	7,6%	38,0%	43,0%	6,3%
Con	It is easy for me to get parents and other caregivers to use prompting and prompt fading procedures with their children	-	-	7,6%	8,9%	36,7%	40,5%	6,3%
Con	It makes me feel good when I see parents using child-initiated and child-directed learning activities	-	-	3,8%	2,5%	25,3%	46,8%	21,5%

In the domain of instructional practices and teaching methods, the practitioners are most frequently competent and confident in their work (see Table 5).

Table 6 *Natural Learning Environments*

	Items	1	2	3	4	5	6	7
Com	I am able to get parents I work with to use everyday family and community activities as sources of child learning opportunities	-	-	3,8%	7,6%	38,0%	45,6%	5,1 %
Com	I am almost always certain that I will be able to identify and use children's personal interests to improve child learning	-	-	3,8%	12,7%	40,5%	26,6%	16,5%
Con	I feel that the children I work with benefit a great deal from everyday informal learning opportunities	-	1,3%	5,1%	8,9%	36,7%	31,6%	16,5%

The practitioners are most frequently able to utilize the daily activities of the family and the child's environment as a means to enable the child's learning and promote child engagement. They are mostly competent in identifying a child's interest as a child-initiated learning opportunity. They mostly believe that the children they work with daily acquire some knowledge (see Table 6).

Table 7 *Collaboration and Teaming*

	Items	1	2	3	4	5	6	7
Com	I am able to successfully implement interdisciplinary interventions taught to me by professionals from other disciplines	-	-	1,3%	7,6%	27,8%	41,8%	21,5%
Com	Jointly planning and implementing interventions with other professionals insures that the children I work with get the right kind of practices	-	-	5,1%	2,5%	34,2%	40,5%	17,7%
Con	Helping other team members do what I do best (role release) makes me feel good about the interventions children and families receive	-	-	-	6,3%	17,7%	30,4%	45,6%
Con	I am able to get families to be key players in identifying IFSP outcomes	-	1,3%	3,8%	3,8%	27,8%	48,1%	15,2%

The practitioners most frequently consider themselves to be successfully applying their acquired knowledge; they enjoy the processes of planning and implementing early intervention with other team members. They feel positive when helping other team members and are mostly capable of actively involving and informing the parents they work with about the family's role in determining what is important for both the parents and their child (see Table 7).

Table 8 *Early Literacy Learning*

	Items	1	2	3	4	5	6	7
Com	I make sure I help parents and other caregivers understand and use emergent literacy learning activities with their children	-	-	3,8%	6,3%	35,4%	40,5%	13,9%
Com	I am able to get parents to understand why parent/child sound and word games are important for children's early literacy learning	-	-	3,8%	5,1%	26,6%	51,9%	12,7%
Con	I am pretty good at helping parents provide their children early literacy learning experiences	1,3%	1,3%	3,8%	10,1%	32,9%	40,5%	10,1%

The practitioners most frequently assist the parents and other caregivers in implementing every learning activity; they are mostly capable of explaining the importance of sounds and words in early learning to the parents; they are also most frequently successful in informing the parents about what is necessary for the stimulation of the child's development (see Table 8).

DISCUSSION

The self-evaluation of the practitioners who work with children with disabilities, in the domain of early intervention, provided results which indicated a high level of both their competence and their confidence, in all of the practices (parent-practitioner collaboration, self-judgment, individualized plan development, instructional practice, environmental learning and inclusion, cooperation and teaming, early intervention). These results are in accord with the research conducted in three schools in Jordan, where – in the practitioners' opinion – individualized education plan development, parent-practitioner collaboration and the professionals' knowledge were ranked as being of greatest importance (Sheikh et al., 2014).

The results are also in accord with the findings of a research conducted in Pakistan, where practitioners have a high degree of confidence in their work with children with disabilities (Makela, 2000). Rifai (2005) states that the professionals mostly acquired their competence during the course of their academic studies (Sheikh et al., 2014). The research we conducted also indicates that the practitioners gain most of their knowledge preservice, during their years of education; furthermore, this is what they consider to be the optimal method for the acquisition of knowledge and skills.

All research conducted on the topic of parent-practitioner collaboration indicates that the practitioners mostly consider themselves as competent in collaborating with the child's family members. They are, predominantly, confident in their own work. A case in point is the research organized in Connecticut. Both the practitioners in Serbia and the ones in Connecticut believe themselves – in terms of self-evaluation – to be capable of identifying a child's expressed interest and treating it as a child-initiated learning opportunity (University of Connecticut. A.J. Pappanikou Center, 2007).

The self-confidence of the practitioners in Serbia is lower when it comes to assessing the child's abilities. The results from our research reveal that the personnel who work with children with disabilities mostly regard themselves as competent in developing individualized educational plans and that they possess a high degree of confidence, which is also confirmed in the domain of teaching practices.

The practitioners in Serbia are usually able to use the everyday activities of the family and the child's environment as a means to further their learning; they are mostly competent in identifying a child's expressed interest in order to utilize it for learning and they believe that the children they work with usually learn something new, on a daily basis. The practitioners in Connecticut are more confident – they believe that the children they work with always learn something new (University of Connecticut. A.J. Pappanikou Center, 2007). Cooperation with other team members ensures that the whole team aptly acquires new knowledge and skills; it also provides them with abundant opportunities for professional development (Kearns, Kleinert, Thurlow, Gong & Quenemoen, 2015). Additionally, our research found that the practitioners value the collaboration with parents and other practitioners highly – they most often consider themselves as competent in terms of cooperation and manifest a high degree of confidence. The research conducted in the United States of America shows that the professionals marked individualized plan construction, its implementation and the assessment of progress as greatly important skills for their work. They believe themselves to be very competent in terms of individualized education plan development and the assessment of the child's condition (Margaret, Deborah, Stacey & Sullivan, 2012). The research we conducted indicates that our practitioners have a lower level of confidence when assessing the condition of the disabled children; they, nonetheless, consider themselves as successful in constructing individualized education plans. The practitioners evaluated themselves as usually competent and highly confident in the practices of individualized plan development, instructional practice and teaching methods, environmental learning and inclusion, cooperation and teaming, and early intervention. The domain of parent-practitioner collaboration shows a somewhat lower degree of competence and confidence, in comparison to the aforementioned domains. The cause for this may be insufficient formal training, without which the professionals cannot establish an adequate contact with the parents, and, thus, cannot ameliorate the collaboration. The practitioners consider themselves as competent in the domain of self-evaluation. However, our research indicates that they do not have a satisfying level of confidence in neither this practice nor the practice of assessment of the child's abilities. The cause for this may also be insufficient formal training, due to which the practitioners do not acquire a satisfactory amount of knowledge over the course of their education and in-service professional development.

CONCLUSIONS

1. The practitioners that participated in our research possess a high degree of competence and confidence in working with children with disabilities.
2. The research confirmed that the practitioners have very little formal training in the domain of early intervention when working with the children and their parents/guardians.
3. The practitioners are part of transdisciplinary teams which allow for cooperation and the distribution of knowledge, in the aim of maximizing efficiency and confidence when working with the child.

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QUALITY OF LIFE OF PATIENTS AFTER TOTAL LARYNGECTOMY – SF-36

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SUMMARY

Objective. *The aim of this study was to assess the quality of life of patients after total laryngectomy and to determine the influence of a vocal rehabilitation on the improvement of the quality of life of these patients.*

Methods. *The study included 45 patients, 25 patients were in the experimental group and 20 patients were in the control group. The experimental group consisted of male respondents after total laryngectomy who mastered esophageal speech, aged 54 to 72 years. A subjective assessment of voice was conducted, using the SF-36 questionnaire which is valid and culturally adapted version of the Serbian language, consisting of 36 questions, which measures functioning in the following areas: functional ability, physical ability, emotional capacity, vitality, mental health, social functioning, pain and general health.*

Results. *SF-36 has shown that patients after vocal rehabilitation have higher scores on all subtests. Using the t test for large independent samples, a statistically significant difference has been found between the experimental group at the beginning of the measurement and control group on all subtests. Statistical significance is at the 0.01 level. The mean value (M) is lower in the experimental group at the beginning of measurement than the control group. In contrast to this result, there is no statistically significant difference between the experimental group at the end of the measurement and control group.*

Conclusion*. Vocal rehabilitation was significant in patients after total laryngectomy; in addition to mastering some of the methods of speech, these patients were able to overcome the feeling of shame because of their physical appearance after the operation and to strengthen their self-confidence.*

Key words: Laryngeal Neoplasms**,** Total Laryngectomy, Vocal Rehabilitation, Quality of Life, Measurement, SF-36 scale

INTRODUCTION

Total laryngectomy is a radical operation that leads to permanent loss of the generator and the part of the resonator of voice, larynx, which creates basic laryngeal tone. It leads to change in the normal anatomical relationships in the neck, causing disruption of communication and changing the psychosocial status of the patient (Mitrović, 2008). It is done if the laryngeal tumor advanced (T3 and T4) and partial laryngectomy cannot be done.

Total laryngectomy exposes a patient to a great mental stress, both due to the underlying disease and the loss of a very important organ in the general functioning of the body (Petrović-Lazić, 2001). It is the result of physical and functional changes that may affect the emotional well-being and some of the most basic functions of life, including breathing, swallowing and communication (Doyl & Keith, 2005).

Head and neck tumors can affect and damage important anatomical and functional structures related to the physical appearance of a person, the power of speech and communication, and lead to social interaction and the decline in the quality of life (Mc Grouther, 1997). Cancer of the larynx is one of the most common malignant tumors of the head and neck. The indicators of the presence of head or neck tumors may be hoarseness, breathing or swallowing difficulties, enlargement of the lymph nodes of the neck, ear pain. About 95% of laryngeal cancer is caused by excessive consumption of tobacco and / or alcohol, infection with human papilloma virus (HPV- type 16), and poor socioeconomic conditions. Head and neck tumors occur mostly between the ages of 50 and 70 (Head and Neck Cancer, 2011).

Voice rehabilitation after laryngectomy is an important aspect of rehabilitation that enables patients with severe speech disabilities easier resocialization and thus maximum mitigation of severe psychological, social and occupational problems (Petrović-Lazić, Ivanović, Kosanović, 2004).

Rehabilitation starts practically from the moment when the patient is told that the larynx has to be removed.

There are three models of speech for patients after total laryngectomy: esophageal speech (which is most common), electrolarynx and tracheoesophageal speech. Voice rehabilitation integrates elements of psychological and social rehabilitation.

In the preoperative preparation of patients it is desirable to display one or more laryngectomy patients well-speaking rehabilitated who will demonstrate their speaking skills, emotional and social stability. The role of family of laryngectomy patient is undoubtedly of great importance for his complete rehabilitation and resocialization (Stanković, Đukić, Janošević, 2004).

It is believed that quality of life is multidimensional, because it includes a wide range of aspects, including physical, functional, emotional and social well-being and satisfaction. It is also subjective, because it can be understood from the patient's point of view (Cella, 1992; Bowling, 2005).

Although quality of life is not easy to define, the literature provides a number of attempts to define this subjective expression. Some of these attempts define quality of life as a state of well-being that includes two components: the patient's ability to perform daily activities that maintain physical, mental and social well-being; and satisfaction of the patient in the levels of functioning and control of the disease (Bottomley, 2002).

Personality traits have great impact on the quality of life of the laryngectomy patient, as well as previous way of life, social relations, interests, occupations.

Therefore, the aim of this study was to assess the quality of life of patients after total laryngectomy and to determine the impact that a vocal rehabilitation has on the improvement of the quality of life of these patients.

METHODS

Research involved 25 male participants of the experimental group, and the control group consisted of 20 respondents. Experimental group consisted of patients after total laryngectomy. The age of respondents ranged from 54 to 72 years, an average of 61.08 years. Three-year study was conducted in the period from April 2012 to September 2015. Patients were sent to speech therapy after completion of treatment (only operative or combination of operative treatment with radiation therapy) in order to master a method of speech: esophageal or electrolarynx. In this case, the patients have mastered esophageal speech. Treatments for 23 patients were carried out twice a week and once a week for two patients because of the distance of residence from a given facility. A treatment lasted from 25 to 45 minutes, and the time to master esophageal speech ranged from four to seven months (average 5.5 months). A subjective voice assessment has been conducted using a Questionnaire SF-36, which has 36 questions, of which 35 questions are grouped in eight domains: physical functioning, physical ability, emotional well-being, vitality, social functioning, mental health, physical pain and general health, and one question refers to a change in the health relative to one year preceding the study, i.e. whether the current health is better, the same or worse (Ware & Sherbourne, 1992). The resulting scores range from 1 to 100, where higher scores indicate better quality of life. Respondents completed a questionnaire for the first time when they came to the clinic and for the second time 15 to 30 days after the completion of vocal rehabilitation. Time of completing the questionnaire was not restricted. Before the beginning of the questionnaire, each respondent was explained the research plan.

Of the measures of descriptive statistics, the mean was used with accompanying standard deviation as well as minimum and maximum. The frequency and percentages were used. Differences between groups were determined using the t test for large independent samples, as well as the t test for paired samples. The Pearson correlation coefficient was used to test the connection between two continuous variables. Statistical significance was defined at the level of probability of the null hypothesis from $p \leq 0.05$ to $p < 1$. Statistical processing and analysis were done in the computer program SPSS ver. 20 (Statistical Package for the Social Sciences).

RESULTS

The study involved 45 respondents, 25 respondents were in the experimental group and 20 respondents were in the control group. The experimental group consisted of male respondents after total laryngectomy that mastered esophageal speech (Table 1). All respondents were smokers, with different education (mainly secondary school) and professions. Respondents were mainly coming from urban areas.

Table 1 *Descriptive indicators, the experimental group*

		Frequency	Percentage
Gender	Female	0	0
	Male	25	100
Smoking status	Smoker	25	100
	Non-smoker	0	0
Education	Primary school	2	8
	High school	17	68
	VSS and more	6	24
Interest	Engineer	4	16
	Craftsman	10	40
	Farmer	4	16
	Economist	2	8
	Trader	2	8
	Cop	1	4
	Baker	1	4
	Waiter	1	4
City life	Village	8	32
	City	17	68
Vocal rehabilitation	Esophageal speech	25	100
	Electrolarynx	0	0

The age of respondents ranges from 54 to 72 years, while the average age is 61.08 years (Table 2). The smoking duration ranges from 19 to 50 years, average 33 years. Length of service ranges from 17 to 40 years. The average length of service is 29.9.

Table 2 *Descriptive indicators, the experimental group*

	N	Min	Max	M	SD
Age	25	54.00	72.00	61.0800	5.07379
Smoking duration (years)	25	19	50	33.00	7.159
Length of service	21	17	40	27.90	6.518

N- number of respondents, Min- minimum, Max- maximum, M-arithmetic mean (median),SD- standard deviation,

SF-36 scale was used to measure the functioning of the respondents in the following areas: functional ability, physical ability, emotional capacity, vitality, emotional well-being, social functioning, pain and general health. The Table 3 shows the values of the SF-36 scale before and after vocal rehabilitation. The mean values (M) show that before treatment the respondents had the lowest score on the subscale related to physical ability, 0.00, and the score after treatment significantly increased and amounted to 97.00. Lower score before treatment was also on the subscales related to social functioning, 13.50, general health 15.80 and vitality 17.00, while the high scores were on the subscales involving pain, 94.60 and functional capacity, 66.20, which can be seen in the Figure 1.

After treatment there was a significant increase in output on all subtests, which can be seen in the Figure 2. The obtained lower scores on subtests suggest a very poor general health condition of the patients before treatment, and the increase in scores after treatment shows its improvement in the whole.

Table 3 *SF-36 scale in the experimental group before and after treatment*

		N	Min	Max	M	SD
Before treatment	Physical functioning	25.00	40.00	85.00	66.20	11.57
	Role limitations due to physical health	25.00	0.00	0.00	0.00	0.00
	Role limitations due to emotional problems	25.00	33.33	33.33	33.33	0.00
	Energy/ fatigue	25.00	0.00	40.00	17.00	10.90
	Emotional well being	25.00	0.00	44.00	20.96	10.47
	Social functioning	25.00	0.00	25.00	13.50	8.00
	Pain	25.00	67.50	100.00	94.60	8.25
	General health	25.00	5.00	35.00	15.80	8.50
After treatment	Physical functioning	25.00	65.00	100.00	89.60	6.91
	Role limitations due to physical health	25.00	25.00	100.00	97.00	15.00
	Role limitations due to emotional problems	25.00	33.33	66.67	64.00	9.23
	Energy/ fatigue	25.00	70.00	95.00	85.20	6.37
	Emotional well being	25.00	68.00	100.00	87.36	8.14
	Social functioning	25.00	100.00	100.00	100.00	0.00
	Pain	25.00	100.00	100.00	100.00	0.00
	General health	25.00	55.00	85.00	71.60	7.74

N- number of respondents, Min- minimum, Max- maximum, M-arithmetic mean (median), SD-standard deviation,

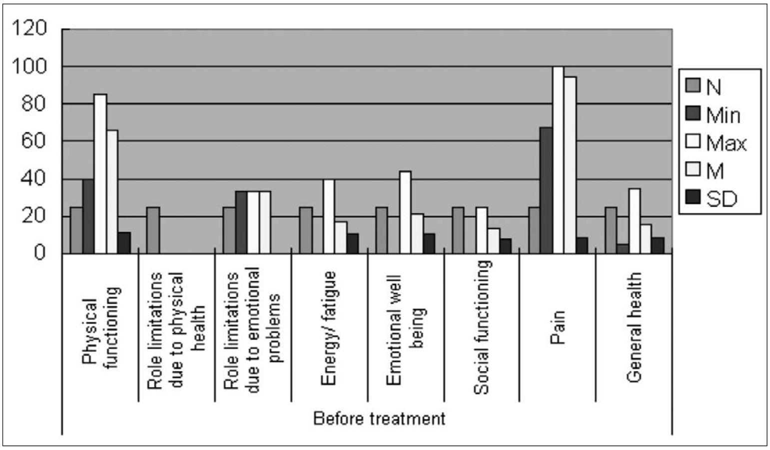

Figure 1 Before vocal rehabilitation

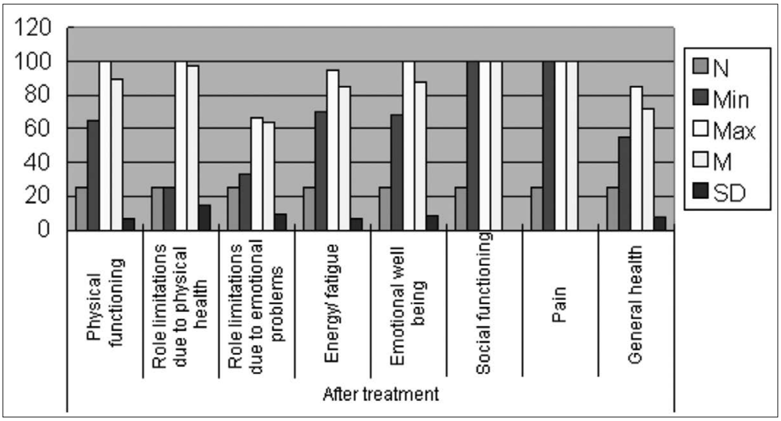

Figure 2 After vocal rehabilitation

The Table 4 presents the results obtained in the control group, which has relatively high scores on all subtests; the highest score was on the subscales concerning the absence of pain, adequate social functioning and absence of physical limitations in daily activities and work. The results show good, very good and excellent functioning at these respondents in all areas.

Table 4 *SF-36 scales in the control group*

	N	Min	Max	M	SD
Physical functioning	20.00	90.00	100.00	99.50	2.24
Role limitations due to physical health	20.00	100.00	100.00	100.00	0.00
Role limitations due to emotional problems	20.00	66.67	66.67	66.67	0.00
Energy/ fatigue	20.00	80.00	95.00	89.00	7.00
Emotional well being	20.00	68.00	100.00	85.80	10.74
Social functioning	20.00	100.00	100.00	100.00	0.00
Pain	20.00	100.00	100.00	100.00	0.00
General health	20.00	45.00	95.00	73.00	16.42

N- number of respondents, Min- minimum, Max- maximum, M-arithmetic mean (median), SD-standard deviation

The t test for paired samples was used to examine whether it has come to change in the results of the respondents measured by the SF-36 scale before and after the treatment (Table 5).

It has come to changes in all subtests, i.e. measured functionalities. All statistical significances are at the 0.01 level. A higher score on the SF-36 scale means better functionality, so it can be seen that the mean value (M) is higher after the treatment on all subtests. Therefore, the functionality of all measured elements is better after the treatment.

Table 5 *The difference before and after the treatment of the SF-36 scale, the experimental group*

	M	SD	t	df	***p***
Physical functioning, before	81	18.85	-6.108	44	***.000***
Physical functioning, after	94	7.28			
Role limitations due to physical health, before	44.44	50.25	-6.782	44	***.000***
Role limitations due to physical health, after	98.33	11.18			
Role limitations due to emotional problems, before	48.15	16.75	-7.026	44	***.000***
Role limitations due to emotional problems, after	65.19	6.95			
Energy/ fatigue, before	49	37.35	-3.017	44	***.000***
Energy/ fatigue, after	86.89	6.85			
Emotional well being, before	49.78	34.22	5.1	44	***.000***
Emotional well being, after	86.67	9.3			
Social functioning, before	51.94	43.87	6.54	44	***.000***
Social functioning, after	100	0.00			
Pain, before	97	6.67	0.99	44	***.000***
Pain, after	100	0.00			
General health, before	41.22	31.34	4.67	44	***.000***
General health, after	72.22	12.23			

M-arithmetic mean (median), SD-standard deviation, t-test, df-degree of freedom, p –statistical significance

The t test for large independent samples was used to examine whether there has been a statistically significant difference between the experimental group at the beginning of the measurement and control group, and between the experimental group at the end of the measurement and control group (Table 6). There is a statistically significant difference between the experimental group at the beginning of the measurement and control group on all subtests. Statistical significance is at the 0.01 level. When observing the mean values (M), it can be seen that the mean value is lower in the experimental group at the beginning of the measurement than the control group.

Table 6 *The difference between the experimental and control group in the SF-36 scale*

		M	SD	t	df	p
Physical functioning, before treatment	Experimental	66.20	11.57	-14.06	26.22	0.00
	Control	99.50	2.24			
Role limitations due to physical health, before treatment	Experimental	0.00	0.00	/	/	/
	Control	100.00	0.00			
Role limitations due to emotional problems, before treatment	Experimental	33.33	0.00	-14.02	26.52	0.00
	Control	66.67	0.00			
Energy/ fatigue, before treatment	Experimental	17.00	10.90	-26.84	41.27	0.00
	Control	89.00	7.00			
Emotional well being, before treatment	Experimental	20.96	10.47	-20.35	40.40	0.00
	Control	85.80	10.74			
Social functioning, before treatment	Experimental	13.50	8.00	-54.04	24.00	0.00
	Control	100.00	0.00			
Pain, before treatment	Experimental	94.60	8.25	-3.27	24.00	0.00
	Control	100.00	0.00			
General health, before treatment	Experimental	15.80	8.50	-14,14	27.04	0.00
	Control	73.00	16.42			
Physical functioning, after treatment	Experimental	89.60	6.91	-6.74	30.04	0.00
	Control	99.50	2.24			
Role limitations due to physical health, after treatment	Experimental	97.00	15.00	-1.00	24.00	0.33
	Control	100.00	0.00			
Role limitations due to emotional problems, after treatment	Experimental	64.00	9.23	-1.44	24.00	0.16
	Control	66.67	0.00			
Energy/ fatigue, after treatment	Experimental	85.20	6.37	-1.88	38.99	0.07
	Control	89.00	7.00			
Emotional well being, after treatment	Experimental	87.36	8.14	0.54	34.68	0.59
	Control	85.80	10.74			
Social functioning, after treatment	Experimental	100.00	.00000a	/	/	/
	Control	100.00	.00000a			
Pain, after treatment	Experimental	100.00	.00000a	/	/	/
	Control	100.00	.00000a			
General health, after treatment	Experimental	71.60	7.74	-0.35	25.71	0.73
	Control	73.00	16.42			

M-arithmetic mean (median), SD-standard deviation, t-test, p-statistical significance, df-degrees of freedom

In contrast to this result, there is no statistically significant difference between the experimental group at the end of the measurement and control group on most subtests. Furthermore, a difference is found on one subtest only, Physical functioning, after the treatment. Physical functioning of the control group is somewhat better (M=99.50) compared to experimental one after the treatment (M=89.60). Although there is a statistically significant difference, however, the score of the physical functionality and the experimental group after the treatment is good because the average is high (M=89.60), if we know that the maximum is 100.

DISCUSSION

Results of this study show that cancer of the larynx occurs more frequently in men than in women, which is similar to results of previous studies. Carcinoma of the larynx is 4-5 times more common in men than in women (Petrović-Lazić et al., 2004). The percentage of patients with laryngeal cancer is higher among male respondents (Dragičević, 2013). Carcinoma of the larynx is discernible more frequently in male subjects than women, the ratio was 91.5%:8.55 (Rosso et al., 2012), while the ratio of 90.9% in men and 9.1% among women (Mumović, 2008).

The age of the respondents in this study ranged from 54 to 72 years, an average of 61.08 years. Other studies have had similar results. The average age of respondents was 63 years (Woodard et al.,2007). According to (Mumović, 2008), 80% of patients are aged between 50 and 70 years. Laryngeal carcinoma occurs over a period of 61 to 70 years (Dragičević, 2013).

Assessment of quality of life in this study was conducted by scale SF-36. This is one of the most commonly used instruments in patients with cancer of the larynx, which proved to be highly reliable and valid (Masconi et al., 2000; Weymuller et al., 2000; Armstrong et al., 2001).

These patients have many symptoms in various domains: impaired general health and pain, impaired communication, nutrition, psychological symptoms that include depression, irritability, loss of self-esteem (occasional sense of shame), impaired social relationships, including problems with a partner (sexual relations) and with other family members, a reduction of income and a sense of uselessness. All these have a negative impact on the everyday life of these patients (Babin, et al., 2008), and therefore the quality of life. Results of this study have shown that patients before a vocal rehabilitation have poorer quality of life. Because of their physical appearance the mean value of which was M=0.00 after the operation and before a vocal rehabilitation, they were limited in social activities and work (M=13.50), which had a negative impact on their overall health condition (M=15.80) and created a sensation of exhaustion (M=17.00). Compared with the results of the control group, a big difference can be noticed. There is a statistically significant difference between the experimental group at the beginning of the measurement and control group on all subtests. Statistical significance is at the 0.01 level.

When observing the mean values (M), it can be seen that it is lower in the experimental group at the beginning of measurement than in the control group.

The difference is also present in physical functioning in comparison with the results of the control group (Schuster et al., 2003).

In this study physical appearance and inability to speak reflected negatively on the emotional state of the patient and therefore the decline in the quality of life of these patients, as it can also be seen in previous studies (Mc Grouther, 1997; Doyl et al., 2005).

Physical consequences which leaves a total laryngectomy restrict the patient in further social activities (Mohide et al., 1992). Removed larynx is a major psychological stress for the patient, which reflects badly on his functional capacity, and quality of life (Morton, 2003). The presence of tracheostomy causes discomfort and loss of self-esteem and inability of communication with family and friends can lead to social isolation (Trzcieniecka-Green et al., 2007).

However, (DeSanto et al., 1995) suggest that patients who underwent total laryngectomy are much more concerned about the presence of tracheostomy and disrupted social activities than the disturbed communication.

After vocal rehabilitation, the score on the SF-36 scale increased significantly, and a higher score means better functional ability. The mean value (M) was higher on all subtests, particularly in the physical functioning (M=97.00). The inclusion of patients in the process of vocal rehabilitation and mastering speech is one of the important factors in this study that influenced the improvement of the emotional state of these patients, but also their quality of life.

In their study, (Silva et al., 2015) suggest that patients after total laryngectomy compared with normal population have lower quality of life, but mastering esophageal speech has led to improved physical and functional abilities. The inclusion of patients in the process of vocal rehabilitation and mastering speech is of great importance to maintaining and improving the quality of life. Speech and appearance are important domains that affect functional abilities of patients, as reported by other authors (Vilascea et al., 2006).

Vocal rehabilitation has a positive impact on the quality of life of patients after total laryngectomy, as well as the method of mastering speech, trahoezofagealna prosthesis has had a positive impact on the quality of life in relation to esophageal speech (Giordano et al., 2011).

The emotional state of the patient may affect positively on the physical condition and social functioning of the patient. Family members should be with the patient from the beginning of treatment, in order to provide support and encouragement for the further treatment. During vocal rehabilitation, it is important to establish an appropriate relationship between the patient and speech therapist-vocal therapist, which enables on the one hand faster overcoming of disturbed functional abilities and better mastery of some of the methods of speech.

CONCLUSION

Vocal rehabilitation has great significance in patients after total laryngectomy. The positive effect is achieved primarily by mastering some of the methods of speech, then overcoming a sense of shame because of different physical appearance after the operation, strengthening self-confidence and creating a sense of security. Quality of life is currently most commonly measured through various written questionnaires, by which we obtain information about how much the patient is able to perform daily activities through which we observe his mental, physical and functional state, but also how much the patient is satisfied with the achieved level of functioning and control of the disease.

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HEALTH CARE QUALITY FOR PERSONS WITH INTELLECTUAL DISABILITIES[a]

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SUMMARY

The aim of this research is to make comparison between the parents of children with disabilities and parents of typically developing children regarding the level of their satisfaction with the quality of health care provided for their children and to rank factors influencing the quality of health care for children with disabilities.

The sample consisted of parents of 91 children, ranging in age from 4 to 7 years (M=5.63, SD=1.05), 37 of which were children with disabilities (M_{age}*=5.86, SD=.93), and 54 were children with typical development (*M_{age}*=5.48, SD=1.11).*

In addition to demographic data collected through the specific questionnaire, the reports of parents on performance of health care for their children were also collected by recording their answers on the scale "Quality of health care for preschool children".

It was established that education level of parents influences significantly the level of their satisfaction with the quality of health care for their children. Significant difference between the parents of children with disabilities and parents of the children with typical development regarding their level of general satisfaction with the quality of the health care system for children was not recorded, but also regarding the perceived quality of the procedure for making appointments, waiting time to see the physician and relationship of physicians with the parents and their children.

Key words: mobile support, children with disabilities, health care

INTRODUCTION

Early intervention in children at risk of delayed development or in children already diagnosed with delay in development, serves the purpose of conducting general prevention of disabilities universal for all children at risk and their families, as well as individual prevention programmes designed to prevent certain developmental disorders (Fox et al., 2015). As a part of early intervention, a multidisciplinary team of professionals makes assessment of developmental level of cognitive, language, motor and adaptive skills of children, using predefined protocols and instruments (Bartolotta & Shulman, 2010). It is necessary to establish an efficient cooperation between special

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education teachers, psychologists, paediatricians and other professionals during early intervention, in order to enable sufficient accessibility, quality and stability during the process of identification, management, treatment, education and providing other services needed by children and their families. Physicians and other professionals involved in early intervention need to have access to the combined database of information relevant for child‘s health and preservation of family functioning. Professionals and parents alike need to have on their disposal general and specific information about child, family and unique parent-child interactions. Sensible use of support options and highly individualized support are enabled due to the availability of information about diagnosis and prognostic parameters of further child development dynamics and of the data related to specific difficulties and daily functioning of the child and the family (Guralnick, 2005).

Apart from individual professional competency and experience level, the quality of early intervention also depends on building a good rapport between professionals and family members. The empathy and care expressed by professionals who conduct diagnostic procedures and/or treatment, together with high level of expertise, constitute the basis for high quality, competent service focused on children and their families (Council on Children with Disabilities, 2007).

Despite all these facts, persons with intellectual disability (ID) constitute a vulnerable group in terms of health care deliveries. They have shorter life span and higher risk of associated diseases and disorders (Mencap, 2004), and, additionally, they are often confronted with different limitations and barriers when trying to exercise their right to health care (Green et al., 2004, Krahn, Hammond & Turner, 2006).

The right to primary health care is one of the fundamental human rights, both for persons with typical development and persons with ID (Lennox, & Kerr, 1997). According to the *Law against discrimination on the basis of disability*, refusal to provide medical service and/or setting specific requirements to do so, for a person with disability, when there is a lack of medical justification, is regarded as particularly severe case of discrimination (Article 17.) (Official Gazette of RS, no. 33/2006).

Behavioural difficulties of children with disabilities and the quality of health care

Quite a number of difficulties in providing high quality health care for people with ID are caused by poor training of physicians, and also by the fact that people with disabilities are prone to stress induced problems in behaviour.

Physicians who are not properly trained for work with members of this population might sometimes cancel certain medical procedures, the reason for this being unusual behaviour of people with ID who generally show more pronounced difficulties in respecting social norms.

Untrained physicians’ concern for their own safety and safety of others is often caused by peculiar walk, hand movements and gestures, cries and other patterns of behaviour of people with ID, which are not necessarily connected to aggressive behaviour (Ward, Nichols & Freedman, 2010; Wilkinson et al., 2013).

The long periods spent in the waiting room, waiting to see a doctor, can lead to elevated anxiety and outbursts in people with ID. High intensity expression of behavioural problems in people with ID can cause them to leave the medical facility and miss the scheduled appointment (Ward, Nichols & Freedman, 2010).

Waiting time can influence the perception of the quality of the obtained medical service in people with disabilities. The analysis based on information collected from 27 individuals with ID led to the conclusion that, according to participants' opinion, doctors do not devote enough time to them, while doctors themselves were of another opinion. They claim that providing service for persons with ID is much more time consuming than for persons who belong to the general population. The explanation for this analysis result is connected to a comparison between the lengths of time spent in consultation room and waiting, such that persons with ID get an impression of not being devoted sufficient amount of time (Wilkinson et al., 2013). In order to overcome these problems, it is recommended to assist people with ID when they make medical appointments and to apply positive discrimination when it comes to access to medical institutions.

Communication difficulties and healthcare quality

General practitioners, who do not possess the experience of working with patients with ID, often tend to underestimate their communication capabilities so they address exclusively patients' parents or other accompanying persons during consultation. This can be humiliating for the patients with ID (Ward, Nichols & Freedman, 2010; Wilkinson et al., 2013). According to a study conducted in Australia, the most of the general practitioners included in the study, identified communication hurdles as one of the major difficulties in helping people with ID (Lennox, Diggens & Ugoni, 1997). Based on their previous experience during hospitalization, people with ID expressed a range of negative comments regarding the quality of the provided medical service. They said that medical professionals did not communicate with them and considered irrelevant the information they provided. Participants of the study stated that their difficulties underpinning their higher time consumption for daily activities (taking a bath, going to the toilette) were neglected. Based on the majority of recorded objections, the proposition could be made that nurses were not properly trained and experienced, which reflected in inadequate care provided for people with ID (Smeltzer, Avery & Haynor, 2012). Nurses who consider they don't have enough time to interpret statements of the patients with ID, tend to avoid communication with them. It was found that nurses who invest more time in communication with people with ID, and who tend to employ different strategies in order to establish communication, also have better knowledge of personal characteristics of people with ID, succeed in enhancing mutual understanding and provide health care services of the higher quality (Hemsley, Balandin & Worrall, 2012). Collecting the information from 29 persons providing support to people with ID, it was determined that people with ID who mastered the verbal communalisation could give rather reliable information on whether they feel the pain or not and indicate the part of the body which hurts, using words and patterns of behaviour familiar to the general population. Therefore, it is considered that medical professionals who conduct medical checkups should take their statements into account. However, expressions of emotional anxiety are more idiosyncratic by its nature, and therefore their interpreting requires longer knowing of a particular person with ID (McKenzie, Smith & Purcell, 2013).

Especially challenging aspect of communication with people with ID is the need to give them the negative information about their health. A study which included people with ID, their parents and physicians, established the ambivalence in people with ID as to whether they want to be informed when their health is seriously compromised, or not. Parents' opinion is that they should be the first to obtain this type of information from doctors, in order to decide independently, later, whether they will pass this information on to their child with disability or not. On the contrary, the doctors' view is that, being their patient, a person with ID should be given this information directly. Both doctors and parents agreed that depending on the particular situation, informing people with ID about their health condition can be beneficial or disadvantageous. Whether persons with ID should actually be informed about worsening of their health, or not, depends on their ability to understand the way in which their health is compromised, on how knowledgeable they are and on their capacity to cope with negative information emotionally (Tuffrey-Wijne, 2013).

Support for people with disabilities in claiming their right to health care

The investigation of Parish and others (2008) showed that people with ID who have adequate informal or formal support when accessing medical services, obtain satisfactory level of health care. These authors emphasize that education of medical professionals or volunteers who would assist or advocate people with ID in different health care related situations could compensate for the lack of formal support in these situations. The situations to which this could apply include: making appointments and conducting regular prevention checkups, appropriate for the age of the person; making appointments related to chronic and acute conditions; communication with physicians; following of the physician's instructions during consultations; dealing with fear and other negative emotions related to medical procedures and giving information to the members of the family of a person with ID who could act as support in following guidelines provided by physicians (Parish, Moss & Richman, 2008).

Education of medical professionals

Investigation of physicians' opinion related to their experience in work with people with ID yielded the awareness of need for additional education of medical professionals, since physicians stated they felt inadequately informed and unconfident, sometimes even scared, when they needed to see a patient with ID. According to their opinion, this education would be efficient only if it would be based primarily on the practical work in order to gather the experience, not if it would be mainly theoretical (Wilkinson et al., 2012). Educating medical staff, including general practitioners, specialist doctors, qualified nurses and unqualified nursing staff, within the frames of their primary and continual education, would certainly improve the quality of the provided medical services (While & Clark, 2010). The content of this type of educational programme should include the following: information about general characteristics of the functioning of people with ID, establishing a separate system of record about provided services and treatment outcomes for people with ID, providing people with ID the information about their health status in the form adapted and easily comprehensible for them, and providing people with ID information about available prevention checkups and measures through collaboration with associations for support of people with ID (Michael, 2008). In addition to work invested in increase of knowledge related to improvement of the quality of services provided for people with ID, it is also indispensable to work on changes in attitude of medical professionals towards people with ID as patients. A study by Lewis and others (2010) established that nursing staff attitude towards providing service for people with ID is more negative than for physically disabled people. Nurses opinion is that people with ID should be accommodated separately from other patients, since they are easily upset and then become aggressive, communication with them is more difficult and maintaining their personal hygiene is more demanding (Lewis & Stenfert-Kroese, 2010).

Description of the sample

This study included parents of 91 child, aged 4 to 7 (M=5.63, SD=1.05), 37 of which were children with disabilities and 54 were children showing typical development. Children with disabilities made up a sample of the following structure: children with intellectual disabillities (n=4), children with autism (n=11), children with ADHD (n=5), children with motor disturbances (n=2), sensory disturbances (n=6) and multiple disabillities (n=9). The group including children with disabillities consisted of 54.1% (n=20) boys and 45,9% (n=17) girls, while typically developing group consisted of 48.1% (n=26) boys and 51.9% (n=28) girls. The distribution of male and female participants in these two samples was not significantly different, χ^2 (1, n=91)=.116 p=.734 (Yates correction).

Also, no significant differences were established between the subsamples of children with disabilities (M=5.86, SD=.93) and typically developing children (M=5.48, SD=1.11), regarding the calendar age of participants t(83,41)=-1.75, p=.083.

Instrument description

The questionnaire for collecting demographic data included following information about children: sex, age, type of disability, frequency of visits to physicians within the last year, and about parents: education level (of the mother/father), employment status (of the mother/father), whether they take the child more often to the physicians who work in the private practice or in a public health institution and question related to the family income.

In order to determine the level of satisfaction of parents who have children with disabilities with the quality of the health care services, specific scale “Quality of health care for preschool children“ was created. This scale contains 20 statements related to procedures of appointment making, availability of health care services and satisfaction level with the cooperation with physicians.

Parents of the children with disabilities were given six statements related to particular aspects of the treatment of their child. They were asked to assign each of the statements one number, ranging from 1 to 6. 1 would be assigned to the statement about most important factor influencing the quality of health care provided to their child, according to their opinion, and 6 to the statement about the least influential factor.

Preliminary analyses

One of the mothers of children with disability did not provide information about her education level. Therefore, the comparison of education levels was made using the available information for 54 mothers of children with typical development and 36 mothers of children with disabilities. Significantly lower level of education was established for mothers of children with disabilities (M=2.50, SD=.73) compared to that of mothers of typically developing children (M=3.02, SD=.60) t(64.34)=3.52, p=.001.

Also, one father whose child had a disability did not provide the answer to the question about highest completed education level, so this comparison was also made using the available information on education level of 54 fathers of children with typical development and 36 fathers of children with disabilities. Significant difference in the level of education was confirmed for the sample of fathers as well. Fathers of children with disabilities had a lower education level (M=2.42, SD=.73) then fathers of typically developing children (M=2.96, SD=.73), t(88)=3.49, p=.001.

Common score representing the level of education of the family was calculated, in order to control for the influence of the parents' education level on the level of their satisfaction with the health care of their children.

No significant difference was established between the two groups of participants regarding the choice of the private practice vs. public health service. The majority (76,9%) of the parents whose children show typical development, as well as most (75.9%) of the parents whose children are with disabilities, choose more often to obtain service of the physicians who work in public health institutions χ^2 (1)= .000, p=1.00 (Yates correction).

Satisfaction with the quality of the medical services that children were offered in private practices compared to those obtained in public health institutions didn't show any difference neither over subsamples nor over the whole sample (Table 1).

Table 1 *Satisfaction with the quality of the medical service in the private practice vs. public health institution*

		Md	SD	U	Z	p
Parents of children with disabilities	private	60.00	16.01	75.500	-.077	.939
	public	55.50	12.46			
Parents of children with typical development	private	60.50	16.90	209	-.674	.500
	public	64.00	14.59			
The whole sample	private	60.00	16.63	534	-.614	.540
	public	63.00	14.04			

RESULTS

The comparison between level of satisfaction of the parents of the children with disabilities (M=55.42, SD=11.61) and parents of the children of the general population (M=63.37, SD=15.07) with the quality of health care provided to their children, showed significantly lower level of satisfaction for parents of children with disabilities F(1,89)=7,181, p=.009, $\eta^{2=}$.08.

Comparison of the total scores for the questionnaire used to determine the level of the quality of healthcare provided for children with disabilities, didn't show significant difference between parents of these children (M=55.42, SD=11.61) and parents of children with typical development (M=63.37, SD=15.07) F (1,87)=2.847, p=.095, partial $\eta^{2=}$.032.

The factor analysis showed that the items are grouped around three factors: Making appointment and waiting time to see the physician, Cooperation with the physician and Information important for finding the way around in the health care institution.

Using the Levene's test, it was shown that assumption about equality of variances of the two populations was not correct, F (1, 88)=7.274, p=0.08. Therefore, in order to establish statistically significant differences, the lower p-value was used ($p < 0.001$). When the control for the influence of education level of parents of children with disabilities (M=15.75, SD=4.15), and parents of typically developing children (M=17.57, SD=6.12) was applied, significant differences were not found for the group of items used to investigate level of satisfaction with system for making appointments and length of waiting time to see a physician F (1,87)=.413, p=.522, partial $\eta^{2=}$.005.

Since Levene's test value was significant F(1, 88)=8.358, p=0.05, lower level of significance was applied to interpret the results of two-factor analysis of variance, so $p < 0.001$ is considered to be a significant p-value.

Significant differences were not found for the part of the questionnaire related to the satisfaction with cooperation with physician. Level of satisfaction regarding the cooperation with physician for parents of children with disabilities (M=30.00, SD=7.05), was not significantly different from the level of satisfaction of parents with typically developing children (M=34.98, SD=9.64) F (1,87)=3.301, p=.073, partial $\eta^{2=}$.037.

Lower p-value ($p < 0.001$) was used to detect statistically significant differences, since Levene's test showed unequal variance for the results in both groups F(1, 88)=7.274, p=0.08. Significant difference was not established for items related to getting information and finding the way around the health institution facilities. For these three items, the level of satisfaction expressed by the parents of children with disabilities (M=9.67, SD=2.80) was equal to that of the parents of children with typical development (M=10.81, SD=1.82) F (1,87)=2.839, p=.096, partial η^2=.03.

Priorities influencing the quality of health care for children with disabilities

Thirty out of 37 parents named their priorities which influence the quality of health care services offered to their children. The results are shown in detail in the Table 2.

Table 2 *Priorities influencing the quality of health care for children with disabilities*

		Priority1[1]	Priority 2[2]	Priority 3[3]	Σ[4]
		n (%)	n (%)	n (%)	
1	In addition to the information provided by the accompanying person, the children with disabilities should also communicate their feelings (show the part of body where they feel the pain and similar).	4 (13.3)	1 (3.4)	3 (10.0)	8
2	Additional time should be provided for face-to-face consultation for children with disabilities.	8 (26.7)	7 (23.3)	5 (16.6)	20
3	Physicians should not attribute new symptoms (health deterioration) of the child exclusively and in advance to a disability state and ignore them consequently, should be prepared instead to try to treat or at least relieve them.	8 (26.7)	4 (13.3)	10 (33.3)	22
4	Good communication between physicians and parents	7 (23.3)	10 (33.3)	5 (16.7)	23
5	Assure that children with disabilities follow the instructions of medical professionals during the consultation.	1 (3.3)	2 (6.7)	5 (16.7)	8
6	Assure that children with disabilities respect recommendations of physicians regarding the treatment.	2 (6.7)	6 (20.0)	2 (6.7)	10

[1]Priority 1 – number of parents who designated the content of particular statement as the most important for quality of the health care for their child; [2]Priority 2 – number of parents who designated the content of particular statement as the second most important for quality of the health care for their child; 3Priority 3 – number of parents who designated the content of particular statement as the second most important for quality of the health care for their child; 4Total number of parents of children with disabilities who included the content of particular statement in the first three priorities.

DISCUSSION

General limitations and flaws of the healthcare system are often interpreted as discrimination by the parents of children with disabilities (Thompson, Linehan, Glynn & Kerr, 2013).

In spite of this observation, while controlling for the influence of socioeconomic status in our sample, we could not confirm the difference of the level of general satisfaction with the quality of health care services of parents who have children with disabilities and those whose children belong to general population. To achieve interpretation of results as unbiased as possible, it is necessary to take into account several important differences between two groups of parents detected by primary analyses. The education level and income of parents of children with disabilities was significantly lower than of the parents of typically developing children. Without controlling for the differences in socioeconomic status, the level of satisfaction of parents of children with disabilities was significantly lower compared to the parents of typically developing children.

The studies of other authors also established significant connection between the levels of social deprivation and satisfaction with the quality of health care (Croker et al., 2015). It can be assumed that there is a connection between the influence of the level of education and income of the parents of the children with disabilities and the level of understanding of certain medical procedures. The feeling of fear is present if parents haven't got enough knowledge, experience and can't find the information needed to be able to influence the decisions important for their child's health.

The studies conducted in the USA established that parents of children with special health care needs, who belong to the socially excluded groups, have lower income and show less satisfaction with the medical services their children receive. They are of the view that physicians don't talk to them enough, do not take into consideration their objections and remarks, do not answer their questions and do not devote enough time to their children (Ngui & Flores, 2006).

The result obtained when controlling for the variable of socioeconomic status of parents, shows that parents of the children with developmental disorders are equally satisfied as parents of the children with typical development. It is believed that parents of the typically developing children with the lower socioeconomic status also have less confidence in doctors and health care system (Willems, De Maesschalck, Deveugele, Derese & De Maeseneer, 2005). Parents with higher education levels communicate with physicians more intensely, ask more questions and express their observations and suggestions more often, and, as a result, obtain more information from them (Street, 1992).

The procedure of making an appointment and waiting time to see the physician

When the control for the influence of education level was performed, significant differences between the level of satisfaction with accessibility to the health care services of the parents who have children with disabilities and parents of typically developing children were not determined.

Early intervention includes identification of children at risk of being diagnosed or children already diagnosed with some type of developmental disorder, follow-up and treatment designed to mitigate already developed impairment and prevent potential secondary damage which could compromise further child development. Early intervention may comprise medical support, special education support, psychological, social and other forms of support (Marković & Arsić, 2011). In the early intervention phase, support to the parents is most often provided by the paediatricians, paediatric nurses and home care nurses. To assure the efficacy of early intervention, in addition to professional competences of medical care givers it is necessary to provide easy access to the health care services. This condition is fulfilled if a highly efficient system for making appointments exists and if waiting time to see a physician is relatively short. This process must be adjusted to the child and parents' needs. Financial status of the family of child with disability, education level and working hours of parents, distance between the family residence and health care facility and individual characteristics of the child, as well as all other factors strongly influencing access to the health care services, must be taken into account when a support plan is being made. Factors such as coordination of the medical professionals' work, child support, but also the broader context, meaning that the support should be provided for the family as a whole, have positive influence on the child's possibilities to grow and develop in an environment best suited to its needs (Adams et al., 2013).

The relationship parents establish with the physicians

In this paper, accessibility of the health care services was analyzed, but also the quality of the relationship the parents and their children with disabilities establish with the physicians. In this area, while also controlling for the influence of socioeconomic status, statistically significant differences between the parents of children with disabilities and children with typical development were not recorded.

The relationship between the physician and the parent of a child with a medical condition is rather complicated and depends on both personal characteristics of the two parties, but on the quality of the interaction between the physician and the patient as well. One study conducted in the USA showed a difference among the physicians included in the sample regarding the amount of information they were providing and the need to establish a relationship of equality with the parents. At the same time, all physicians were providing approximately the same amount of socio-emotional support. The relationship between physicians and parents may also be significantly influenced by cultural differences, manifested as different ways of expressing emotions and care for the child. It was demonstrated that parents who express their concerns more intensely obtain higher emotional support from the physicians (Street, 1992).

Understanding, compassion, acknowledging cultural differences as well as coordination of different medical service units, represent a basis for early intervention of the high quality (Sia, Tonniges, Osterhus & Taba, 2004).

The results of another study conducted in the USA demonstrated satisfaction of parents with the cooperation with paediatricians, quality and range of provided services and the level of involvement in decision-making during creation of the treatment plan. The tendency to assess the experience of an early intervention as negative was recorded for the parents of lower socioeconomic status (Bailey, Hebbeler, Scarborough, Spiker & Mallik, 2004).

Informing parents about their health care rights

When controlling for the influence of socioeconomic status, no significant differences were found between parents of children with disabilities and children with typical development for the following three items: "Web site of the health care institution contains all the important information such as address, working hours of different departments and telephone numbers.", "Consultation rooms are clearly labelled by the number or the name of the doctor" and "There is information clearly posted in the waiting room that enables making contact with the patients' rights advocate".

The role of the patients' rights advocate or patients' advisors is to provide the legal advice for the patients. The objections of patients who believe they have been discriminated on a certain basis or their rights were not properly respected are submitted to patients' rights advocate (The Law on Patients' Rights, Official Gazette of RS, no. 45/13). It is possible that the majority of parents of children with disabilities who participated in the study was satisfied with the health care services, and did not pay attention to the information provided about patients' rights advocate. The other interpretation of the obtained results could be related to the level of parents' knowledge about their rights or rights of their children within the health care system. The right to access, right to information, right to free choice and privacy of data, as well as right to objection and reparation of damage (The Law on Patients' Rights, Official Gazette of RS, no. 45/13) are some of the patients' rights that need to be respected in order to enable patients to take an active part in their own treatment or treatment of their children. If person is not aware of their own rights, they also cannot be aware of violation of these rights. Based on our results we can make a proposition that broad campaign is needed, which would provide the information for marginalized groups about their rights and the ways to claim them.

Communication between physicians and parents of the children with disabilities

Statement number 4: "Good communication between physician and a parent is of highest importance for the quality of treatment your child receives", was designated by the largest number of parents, 23 of them (76.67%), as one of their three highest priorities that influence the quality of health care for their children.

Submissive patients, who do not feel equal in communication with physicians follow less closely the recommendations of physicians, compared to the patients who are active in asking for information, who give their own suggestions and whose relationship with physician has a quality of partnership (Davis, 1968). The patient seeking to be involved in treatment process is more informed, shows a higher level of knowledge and readiness to cooperate, follows regularly the indicators important for the health status and respects the physician's recommendation. This type of active, high quality communication with physician could be significant contributor to the positive outcome of the treatment.

There are three possible goals of the communication between patient and physician: creating good interpersonal rapport, exchanging information and making informed decision about application of medical procedures (Ong, De Haes, Hoos & Lammes, 1995). As a primary obstacle emerging in communication with physicians, the parents indicate insufficiently clear explanations related to the diagnosed condition and lack of empathy on the part of physicians. The use of medical terminology and jargon is stressed by parents as another obstacle for the information exchange with physicians (Korsch, Gozzi & Francis, 1968).

Both physicians and patients identified expressing empathy as an important predictor of satisfaction of the patient. Eye contact and physicians interest in patient as forms of affectionate communication, influence strongly patient's perception of the quality of received medical services (Bensing, 1991).

Socioeconomic status of the family also influences the way patients and physicians communicate with each other. Parents who belong to socially excluded groups are more prone to accepting physicians' instructions and less to participating in communication as equal partners, asking questions, asking for additional explanations and information, and expressing their own hopes and fears (Willems, De Maesschalck, Deveugele, Derese & De Maeseneer, 2005). Patients with lower income are the least satisfied with physician-patient communication. Within this group, the highest level of dissatisfaction is present in participants who are functionally literate and engaged in claiming their own rights (Jensen, King, Guntzviller, & Davis, 2010). Within the last decade, the relationship between patient and physician gained features of a business relationship, devoid of expressions of emotions. Patients became more passive, asking fewer questions and expressing less concern, while general practitioners tend to give information related to patient treatment without expressing empathy and initiating a high quality relationship with patients (Bensing et al., 2006).

The time needed for face-to-face consultation for children with disabilities

26.7% of participants in this research isolated statement number 2 (Additional time should be provided for face-to-face consultation for children with disabilities) as the most important factor influencing the quality of the treatment of their child.

A study realised in England, stresses the following factors as the most influential for the quality of health care: active participation of patients in decision-making process related to treatment and the time physicians devote to the patients (Croker et al., 2013). Almost half of participants with low income were not satisfied with the time devoted to them by a physician (Jensen et al., 2010).

The lack of time that physicians face when providing service to the patients of the typical population, constitutes one of the significant factors preventing them from conducting all the recommended screening procedures important for prevention of disease development. (Yarnall, Pollak, Østbye Krause, & Michener, 2003). General practitioners identified lack of time as one of the obstacles for providing high quality service to the people with ID (Lennox et al., 1997). The time necessary for updating medical records and lack of time that could be devoted to the patient, represent a burden for physicians and reduce the quality of their work (Webb & Rogers, 1999).

Possibilities for improvement of the health status of children with disabilities

For 26.7% of participants, the most important factor for the quality of medical treatment of their children, is the prerequisite that physicians do not attribute the symptoms the children complain about, in advance and exclusively to their disability, and consequently ignore them, but to be prepared to treat or at least try to ease these symptoms.

The thrust of patients in physicians depends predominantly on the patient's impression that physicians give careful attention to their symptoms (Croker et al., 2015). Parents believe that expectations of physicians regarding the possibility of improvement of the health of children with disabilities are low, that physicians do not invest themselves too much and do not explore all the possibilities for improvement of health condition of children with disabilities. On the other hand, physicians complain about low-information status and difficulties in communication with parents of children with disabilities (Thompson, Linehan, Glynn & Kerr, 2013).

Self-advocacy skills and health care for children with disabilities

One of the statements offered in the part of questionnaire in which participants of the study were supposed to mark what they consider to be the priority in providing high quality health service for their children with disabilities was the statement that not only the information given be the parent or other accompanying person to the physician is important, but also the direct communication of children with disabilities and physicians. This communication would enable children to express how they feel, show the part of the body where they feel the pain etc., on their own. It seems interesting that small number of parents perceive the direct communication between physician and child as important for the quality of the treatment process. Only 4 (13,3%) of the parents of children with disabilities marked the content of this statement as the most important for the quality of the health care for their children, while 8 of them (26.7%) placed it among the first three most important factors that have influence on their level of satisfaction with their child's treatment.

Regardless of communication difficulties, it is important to encourage children to express in word or gestures, with support of their parents, the way they feel. This is a way to teach the children, starting at preschool age, not to be passive observers, but to interact with their surroundings. It is of the outmost importance for children or adults with ID to be able to convey their feeling of pain. For children who are able to convey this information only with considerable difficulties, it is necessary to develop ability to use alternative forms of communication. This would provide them with means to inform parents and physicians early enough that they feel the pain (Beacroft & Dodd, 2011). It happens that people with ID experience chronic pain for longer periods of time without their suffering being recognized by their parents. Long-term pain considerably reduces the life quality in these persons and influences their behaviour. Regular medical checkups and adequate communication with physicians enable timely detection of pain in children or adults with ID which is a prerequisite to eliminate or relieve this pain (Lewis, Bell & Gillanders, 2007).

It was established that advances in the domain of health care quality and respect of patients‘ rights could be made by implementing programmes designed to develop skills of self-advocacy in health care for adults with moderate and mild intellectual disabilities (Feldman et al., 2012). According to the Social model of disability and Normalization principle, children with disabilities are included in the decision-making process related to medical interventions, together with their parents and physicians. Their decisions are taken into consideration if they do not compromise their health. These decisions are not compulsory if certain intervention is unavoidable or if the person with ID asks for the revision herself, but it gives children with disabilities the sense of being in control and being involved in the treatment process. Children and young people with disabilities want to have basic information needed for informed decision. In addition to the information provided by physicians, experience of other patients who underwent the same or similar medical intervention is also considered as important (Mitchell, 2014).

CONCLUSION

It was established that education level of parents shows significant correlation with level of satisfaction with health care services provided to their children. Based on results we obtained we propose that the more parents are informed, the lower their level of uncertainty is. It was also observed that if they are better informed, their expectations are more realistic and, consequently, their level of satisfaction with the quality of the health service deliveries is higher. Parents of the children with disabilities prevalently possess lower education, have lower income and often belong to socially excluded groups. This gives importance to the improvement of the system of social and medical support, which would allow them to obtain information related to health and treatment of their child in a proper way. By doing so, the feeling of confidence and higher level of thrust in physicians could be experienced by the parents of lower socioeconomic status.

If the influence of the education level is controlled for, the significant difference is not recorded between the parents of children with disabilities and children with typical development regarding neither general satisfaction level with children health care system, nor perceived quality of the procedure for making an appointment, waiting time or attitude towards parent and the child.

According to parents‘ opinion, the factors such as: additional consultation time, good communication with physicians and commitment of physicians to alleviation of symptoms accompanying the disability of their child, would represent a significant additional improvement of the quality of health care provided for their children.

Limitations

The results we obtained could be interpreted solely as a reflection of the quality of health care provided for children with disabilities because the sample consisted of children with different types and levels of disability. The participants with particular type of disability in the sample were not frequent enough to enable analysis of specific aspects of health care for children with intellectual disability, pervasive, motor, and sensory disorders or multiple disorders.

There is also a possibility that the study included a certain number of parents with the lowest education level who are only functionally literate, so they had difficulties to read and answer the questionnaires used in this investigation.

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STUDENTS' CHARACTERISTICS AND THEIR SOCIAL COMPETENCE

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SUMMARY

Although social competence has been the subject of numerous works, there are few researches where this phenomenon is discussed as an organized system – by assessment of different levels of social competence and taking into consideration contextual and individual characteristics of children. The aim of the researches was to examine relations of educational and individual characteristics of students with different aspects of their social competence. There were 206 students examined, aged from 12 to 18, out of which 76 students with mild intellectual disabilities (IDs) and 130 of typical development (TD). For examining social skills we used Social Skills Rating System (SSRS) which consists of subscales of cooperativity, responsibility, assertiveness and self control, and for assessment of social functioning we used The Strengths and Difficulties Questionnaires (SDQ), subscales of pro-social behaviour, emotional problems, behaviour problems and problems with peers. The results confirmed that intellectual disorder with high percentage of common variance (67%) explains more frequent behaviour problems in students with mild IDs than in students with TD, but there are no statistically significant differences between development of social skills and intellectual status of students. Independent of intellectual status, boys have less developed social skills, with a more rarely pro-social behaviour and they show more behaviour problems than girls, which is associated with their worse academic achievement compared to girls. Of all social skills, self control and cooperativity are connected to better academic achievement and prevention of students' emotional problems. Theoretical and practical implications of obtained results are discussed.

Key words: social skills, social functioning, level of intellectual development, gender, age, school achievement, students

INTRODUCTION

Wide range of characteristics and various indicators included in social competence takes many things in its consideration. Literature offers many works related to examination of social behaviour, social skills, behavioural competence, peer relations, which can generally be gathered into the field of social competence. Contemporary approaches of studying social competence are not based on any widely accepted theory model of social competence which is experimentally confirmed, hence the term of social competence has been considered imprecisely defined so far.

First studies of social competence are related to theoretical construct of social intelligence. These early researches were directed towards constructing and examining of validity of some tests of social intelligence, i.e. they indirectly studied independence of social intelligence as a part of intellectual abilities. Measuring instruments then constructed were giving the measures which could not be explained by independent factor of social intelligence. Reviewed from today's perspective the problem was that the tests did not include the component of social functioning, but they only measured the inner component of social intelligence relating to the ability of understanding of behaviour and state of other people. Considering the fact that this ability is inseparable part of general, academic ability, the test results of social intelligence were associated to the measures of academic intelligence.

In a wider sense, the thesis of connection between cognitive and social functioning is in accordance to Piaget and Colberg theory of cognitive, i.e. moral development. It implies that the parallelism of cognitive and social development does not include simple implementation of logics on social problems, but only the fact that social functioning of individual has basic cognitive – structural component (Bandura, 1982). According to this, the authors dealing with research of social competence confirmed that cognitive development is in relation with social competence in the way that refers to abilities and skills of cognitive processing which contribute to successful solving of both unsocial and social tasks and problems (Ford & Tisak, 1983). Socially competent behaviour is related to development of attention process, development of evaluative process and planning process (Eisenberg & Mussen, 1989). Social information must be adequately received, perceived and interpreted so the person could respond to a certain social situation in an adequate way (Crick & Dodge 1994; Dodge et al., 2003). Emotional processes (e.g. emotional regulation) and better understanding of others' emotional states (Eisenberg, Fabes et al., 2006) contribute to effective social functioning of children. Many authors consider that roots of prosocial behavior should be searched in the ability of an individual to feel empathy (Hoffman, 2003; Eisenberg, Spinrad et al., 2006). Yeates and Selman considers social competence as a development of social – cognitive abilities and knowledge, including capacity for emotional control and adequate behaviour in specific context, which, in the other side, the person itself and his/her environment perceive as effective behaviour, and hence they increase their positive psycho – social adjustment (Yeates & Selman, 1989). Similar to this Gresham and Elliot (Gresham & Elliot, 1987) consider that social competence is a construct which includes adaptive behaviour and social skills in mutual dependence.

Starting from conceptualization of social competence as flexible reaction in social situations and effective functioning in interpersonal relationships (Bandura, 1982; Brdar, 1993), the flow of further researches was directed towards studying characteristics of social interaction. Ford and Tisak (Ford & Tisak, 1983) suggest a definition of social competence as realising important social goals in specific social contexts, by using appropriate assessments, which lead to positive developmental outcomes. The authors state several reasons for choosing this definition, but of the most significant theoretical importance is their argument that authenticity of social competence reflects in the ways individuals have learnt how to face specific social situations. They also suggest operational definition of social competence as ability of successful functioning in specific social situations in everyday life. They point out the influence of specific experience in the environment where a child lives, which affects his/her ability to learn and develop social competencies through interaction with various agents of socialisation and through various contexts in which a child develops. Taking into consideration the facts that pro – social behaviour is a positive and an independent predictor of school achievement (Wentzel, 1993) the idea of developing cooperative, social responsible and helpful behaviour through teaching and learning is justified. Generally, the quality of social relationships between teachers and students (Birch & Ladd, 1997) as well as among students themselves contribute both to social (Silver et al., 2005) and academic competence (Elliott, Malecki & Demaray, 2001; Hamre & Pianta, 2001; Peisner-Reinberg et al., 2001).

In the widest sense, social competence means effective functioning in social context and social skills are an important component of socially competent behaviour (Cavell, 1990; Dirks et al., 2007a; Rose-Krasnor, 1997). Social skills represent socially acceptable, learned behaviours, which enable an individual to realize his/her interaction with others in the way which leads to positive and avoiding negative reactions (Gresham & Elliot, 1987). Despite the different views of authors when selecting skills necessary for social competent behaviour, they all agree that there are certain cognitive, social and emotional abilities and skills which contribute to success in interactions with other people. Repertoire of social skills most often contains skills of assertiveness (asking questions, initiating conversation, asking for help...), emotional skills (self – control, recognizing own emotions, empathy...), planning skills (finding the source of problems, making decisions, setting a goal...) and similar skills. The assessment of social competence based on the level of development of social skills belongs to an approach based on contents (Dirks et al., 2007a; Gresham, 1986). If the mentioned social skills play an important part in determining socially competent behaviour, according to McFall (McFall, 1982), there should be obvious significant connection between social skills and the outcome of social functioning. The approach in studying social competence based on the outcome of social behaviour starts from the point that social competence is an evaluative term. The assessment showing that a person is competent in a specific field of social functioning is based on a certain standard criteria and/or in comparison to an adequate normative sample. On this level of analyses the approach to measuring social competence is directed towards the outcomes of social behaviour and most often it is reflected in the context of two qualitatively different forms of behaviour – positive (prosocial behaviour, peer acceptance) and negative (aggressive or withdrawn behaviour, problems with peers).

According to theoretical approaches of the author, operationalization and measuring of social competence refers to assessment of development of social skills or to assessment of different aspects of social functioning. The biggest objection to defining social competence as a set of specific skills and abilities is in the fact that he locates social competent behaviour inside an individual, whilst not taking into consideration context and interactions among individuals. The specificity of situation and the type of interaction have a strong influence on defining what an individual perceives, what affects the very behaviour and response of the individual (Bandura, 1982; Dirks et al., 2007b; Dodge et al., 1985). Many children with developed social skills do not show socially competent behaviour. Consequentially, different levels of assessment of social competence can, but do not have to be in correlation. The fact shows that development of social skills is not sufficient for understanding and studying social competence of an individual and it cannot be equalled to it (Rose-Krasnor, 1997). It does not mean that there are no individual differences in social skills and motivational factors important for effective social functioning, but it is as well important to review the context where social competence has been defined. This leads to the importance of the criteria of the person who assesses social behaviour in a given context (Dirks et al., 2010). In this way McFall defines social competence as an assessing of other people whether an individual acts effectively (McFall, 1982).

It can be concluded that defining concept of social competence is a very complex job, considering that expression of social skills depends on an individual's aim in a certain context, age, cognitive abilities, sources of assessing and numerous other individual and environmental correlates. By analysing different approaches and defining of social competence, and which are reduced to just a few of its determinants, Rose–Krasnor (Rose–Krasnor, 1997) suggests a definition where effectiveness in social interactions includes common product of behaviour of an individual in a certain context and reacting of its social environment, where the quality of realised social relationships depends on skills and abilities of all participants in the interaction (Rose–Krasnor, 1997). An important aspect of studying of social competence still refers to social skills and the role of cognitive and emotional processes in mediation of behaviour, but also to individual and situational – environmental factors which are reciprocal and which influence the outcomes of social functioning of an individual. Social competence cannot be reduced to any single indicator or a set of specific skills and abilities of an individual, but it includes assessment and review of all mentioned determinants and aspects of social competence.

Despite the mentioned facts, there are few researches where different levels of social competence are examined at the same time, as well as their connection with environmental and personal characteristics of children and young people. For example, whether different levels of social competence represent same or independent constructs. Does a greater influence on learning social skills as well as on the outcomes of social functioning have a level of cognitive development or social experience? Do certain contextual and individual characteristics jointly affect certain aspects of social competence? Is there a connection between academic and social competency of students and in what way are they connected? Without intention to approach these issues in a wider sense, considering a school context, the aim of this research was to examine the connection of educational and individual characteristics of students with different aspects of their social competence.

METHODS

Participants. The participants were 206 children, aged from 12 to 18 years divided into two groups. The group of 130 participants consisted of students of typical development (51% boys) attending ordinary primary (47%) and secondary (53%) schools. The other group consisted of 76 students with mild ID (52% boys) attending special primary (57%) and secondary (43%) school.

Measures

Social skills. Child social skills were evaluated using the teacher form of the *Social Skills Rating System* (SSRS, Gresham & Elliot, 1990). The present study used the 40-item Social Skills Scale, comprised of four subscales – responsibility, cooperation, self control and assertiveness. Each item is rated on the 3-point Likert-type scales to assess the frequency (*never*=0, *sometimes*=1, to *very often*=2). By using Cronbach's alpha coefficient the reliability of sub – scales was examined and it was showed that all the scales in our studies are of a great reliability. Coefficient alpha reliabilities range from 0.84 to 0.89.

Social functioning. For assessing positive and negative outcomes of social functioning it was used *The Strenghts and Difficulties Questionnaires* (SDQ, Goodman, 1997). Teachers also rate behavioural items on the frequency scale. The SDQ has five subscales assessing pro-social behaviour (e.g. 'is student kind to younger children'), conduct disorder (e.g. 'often has temper tantrums'), emotional symptoms (e.g. 'many worries often seems worried'), peer relationships (e.g. 'has at least one good friend'), and hyperactivity (e.g. 'easily distracted'). Considering that the hyperactivity was not the subject of our research, we did not use this scale. Cronbach's alpha coefficient was used to examine the reliability of scales and it was showed that all the scales in our studies are of a great reliability, above 0.7, except a little lower but satisfying reliability of the subscale problems with peers 0.62.

Students' characteristics. By analysis of contents of school documentation as characteristic of students there have been selected intellectual status, chronological and school age, gender, average school achievement and mark in discipline at the end of the school year. The state institutions, as ordinary and special schools are, have obligation to include the kind and level of children's disability into their official documentation. When forming a sample we used data of intelligence coefficient estimated by application of The Revised Scale for estimation of children's intelligence according to the principles of Wechsler–Revisk (Biro, 1997), which are mentioned in the school documentation. On the basis of intellectual coefficient examinees were classified as mild ID (intellectual coefficient from 50 to 70) and typically developed (intellectual coefficient over 70).

Statistical analysis. When examining correlation between two sets of variables (characteristics of students and indicators of social competence) the canonical analysis was applied. When the results required further analysis two – factor ANOVA was applied.

RESULTS

By canonical correlation analysis the connection of variables of social competence with characteristics of students was tested. The analysis selected 3 significant canonical functions.

Table 1 *Coefficients of canonical correlations and their significance*

	Rho	Lambda	Hi2	df	sig
1	.820	.127	394.491	126.000	.000
2	.542	.387	181.249	100.000	.000
3	.500	.548	114.961	76.000	.003

The received coefficients of canonical correlations show that the first pair of canonical variables has a significant correlation (Rho=0.820; p<0.01) which explains even 67, 24 % of common variance (Table 1). In Table 2 we see that this way of connection implies positive connection of behaviour problems with school achievement, and negative connection with school age and intellectual status. The factor of social competence is determined only by behaviour problems, while the factor of characteristic of students is extremely well determined by intellectual status and weaker by school age and achievement.

Table 2 *The structure of the first canonical factor from the left and the right set of variables*

Canonical factors of the left set of variables, social skills and social functioning of students

Factors	F1
SSRS Cooperativity	.133
SSRS Assertiveness	.075
SSRS Self – control	-.096
SSRS Responsibility	.016
SDQ Prosocial behaviour	-.032
SDQ Emotional problems	.227
SDQ Behaviour problems	**.390**
SDQ Problems with peers	.245

Canonical factors of the right set of variables, the characteristics of students

Factors	F1
Gender	-.019
Age	-.124
School age	**-.353**
Achievement	**.384**
Discipline	.214
Intellectual status	**-.962**

The second pair of canonical variables has a significant canonical correlation (*Rho*=0.542; p<0.01) explaining 29.38% of common variance (Table 1). In Table 3 we can see that in this canonical pair there is a positive connection of all social skills and prosocial behaviour with achievement and discipline, and negative with the gender (males have higher scores). Also, the positive is the connection of behaviour problems with gender, and the negative is the connection of achievement and discipline. In other words, the factor of social competence is determined by all variables except emotional problems with peers, and characteristics of students is best determined by variable of gender, and much weaker by achievement and discipline.

Table 3 *Structure of the second canonical factor from the left and the right sets of variables*

Canonical factors of the left set of variables, social skills and social functioning of students

Factors	F2
SSRS Cooperativity	**-.784**
SSRS Assertiveness	**-.350**
SSRS Self – control	**-.511**
SSRS Responsibility	**-.664**
SDQ Prosocial behaviour	**-.452**
SDQ Emotional problems	.058
SDQ Behaviour problems	**.409**
SDQ Problems with peers	.099

Canonical factors of the right set of variables, the characteristics of students

Factors	F2
Gender	**.951**
Age	-.137
School age	-.164
Achievement	**-.358**
Discipline	**-.318**
Intellectual status	-.020

The third way of connecting variables has a significant canonical correlation (*Rho*=0.500; p<0.001) that explains 25 % of common variance (Table 1). In Table 4 we see that this way of connecting implies the positive connection of *cooperation* and *self control* with gender (males have higher scores), school and chronological age, achievement and discipline, while *the emotional problems* are negatively connected with these characteristics of students. The factor of social competence is determined by *cooperation* and *self control*, as well as *emotional problems*, and variables of the right set are determined by all examined students' characteristics except intellectual status.

Table 4 *Structure of the third canonical factor from the left and the right sets of variables*

Canonical factors of the left set of variables, social skills and social functioning of students

Factors	F3
SSRS Cooperativity	**.450**
SSRS Assertiveness	.193
SSRS Self control	**.391**
SSRS Responsibility	.280
SDQ Prosocial behaviour	.297
SDQ Emotional problems	**-.388**
SDQ Behaviour problems	-.100
SDQ Problems with peers	.169

Canonical factors of the right set of variables, the characteristics of students

Factors	F3
Gender	**.307**
Age	**.360**
School age	**.370**
Achievement	**.621**
Discipline	**.524**
Intellectual status	-.032

In order to interpret the results of canonical analyses more precisely, by two – factor analysis we examined the differences in development of social skills and social functioning of the typical and the students with mild ID referring to their chronological and school age. Because of cognitive difficulties, chronological age of children with ID does not correlate with the same school age, so these variables can be considered as the influence of the entire social experience (chronological age), i.e. only school experience (school age) on social competence of students with mild ID.

In Table 5 we see that significant differences referring to age exist on the scale *behaviour problems* and on the scale *emotional problems*, while differences between typical and disabled children exist in all aspects of social functioning, but the greatest existing on the scale *behaviour problems.* Also, it is displayed that on the scales *cooperativity, self control and emotional problems* there is the interaction of age and intellectual status, i.e. the difference of the typical and the disabled children is not the same in the observed groups in these scales. The direction of differences of which group of examinees has higher scores depending on chronological and school age can be seen in the enclosed Table 6.

Table 5 *Significance of the differences on subscales SSRS and SDQ by age and intellectual status*

Source	F (df=202)	η2	Dependent variables	F (df=202)	η2	Source
CHRONOLOGICAL AGE	2.742	.013	Cooperativity	.451	.002	SCHOOL AGE
	.876	.004	Assertiveness	.336	.002	
	.002	.000	Self control	.079	.000	
	1.036	.005	Responsibility	.502	.002	
	.706	.003	Pro – social behaviour	.048	.000	
	1.921	.009	__Emotional problems__	__6.611__	__.032*__	
	__7.699__	__.037**__	__Behaviour problems__	__16.525__	__.076***__	
	,086	0,000	Problems with peers	0,000	0,000	
INTELLECTUAL STATUS	1.898	.009	Cooperativity	1.548	.008	INTELLECTUAL STATUS
	.857	.004	Assertiveness	.070	.000	
	.840	.004	Self control	2.755	.013	
	.016	.000	Responsibility	.000	.000	
	.727	.004	Pro – social behaviour	.459	.002	
	2.245	.011	__Emotional problems__	__4.527__	__.022*__	
	__19.718__	__.089***__	__Behaviour problems__	__15.245__	__.070***__	
	__5,831__	__0,028*__	__Problems with peers__	__7,240__	__0,035**__	
INTERACTION OF AGE AND INTELLECTUAL STATUS	2.603	.013	__Cooperativity__	__7.334__	__.035**__	INTERACTION OF SCHOOL AND INTELLECTUAL STATUS
	3.478	.017	Assertiveness	2.350	.012	
	__5.957__	__.029*__	__Self control__	__8.090__	__.039**__	
	1.527	.008	Responsibility	2.604	.013	
	.111	.001	Pro–social behaviour	.091	.000	
	__19.353__	__.087***__	__Emotional problems__	__11.145__	__.052**__	
	.791	.004	Behaviour problems	.057	.000	
	,692	0,003	Problems with peers	1,348	0,007	

*p<0,05; **p<0,01; ***p<0,001

As we can see in Tables 5 and 6, students with mild ID perform significantly more difficulties in all the observed aspects of social functioning in relation to their TD peers. The main effect of these differences is the greatest for *behaviour problems*, but in the secondary school *behaviour problems* of students with mild ID (M=3.60; M=2.81), as well as the TD (M=2.80; M=2.13), decreases. Students with ID have significantly more *problems with peers* than the TD (M=5.11; M=4.65), and with age, *emotional problems* of students with mild ID are significantly more frequent, while in TD students they decrease with age ($p<0.001$; $\eta^2=0.087$). Also, findings of significant interaction of age and intellectual status, i.e. school and intellectual status on the scale of *self control* indicate that adolescents with ID of older age (M=13.56; M=11.98), and in secondary school (M=13.31; M=11.32) perform weaker *self control*, while the *self control* of the TD students is getting better with age (M=12.55; M=14.19). This is also the case with *cooperativity*, but more significant interaction exists only when school age is at stake. In secondary school graders *cooperativity* of the young with mild ID is significantly weaker than in primary school graders (M=14.09; M=12.74), while it increases in typical students (M=11.48; M=13.71).

DISCUSSION

The main purpose of our research was to find out the way in which the educational and the individual characteristics of students are associated with different aspects of their social competence. When the intellectual status is at stake, the obtained findings confirmed that the TD students and students with mild ID do not differ in development of *social skills and prosocial behaviour*, but it was confirmed with a high percent of common variance that students with mild ID perform significantly more *behaviour problems* than their TD peers. We consider these findings especially relevant since the literature (Fenning et al., 2011; Leffert et al., 2010; Neece & Baker, 2008) associates high prevalence of *behaviour problems* of children with ID with their deficit of social skills. Thorough two – factor analyses confirmed that at the younger age, i.e. in higher grades of primary school students with mild ID even have higher scores on the scales of *self control,* and especially of *cooperativity* than the typical, what is associated with their better school achievement than the achievement of TD students. In literature it is quoted that children with ID have expressed cooperativity (Žic Ralić, 2010) and they behave prosocially (Jelić & Stojković, 2016a) tending to satisfy requests either of their parents, peers or teachers so they can confirm their social competence and self – respect. However, similar to the findings in another work (Jelić & Stojković, 2014), it has been showed that with a greater school experience i.e. in secondary school students with mild ID perform *cooperativity and self – control* more rarely, while in the typical the expression of these skills is more frequent. The finding that the interaction of chronological age and intellectual status does not affect *cooperativity* and significant but very low in *self control*, points out that weaker *cooperativity and self control* of young people with mild ID in secondary school are significantly affected by school experience. Furthermore, the results confirmed that students with mild ID at younger chronological age have fewer *emotional problems* than the TD, but with greater social experience they are significantly more present in young people with mild ID, while they are decreasing in the typical. Considering the fact that the main effect of intellectual status on *emotional problems* is very low indicates that environment has more significant influence on *emotional problems* of students with mild ID than intellectual deficits. In relevant literature the overprotective attitude of parents of children with ID is a key explanation of *emotional problems* of children and young people with ID (Al-Yagon 2007; Baker & Crinc, 2009; Fenning et al., 2007; Landry et al., 2000), but there are more and more works which indicate that the quality of relationships teacher – student significantly contribute to the outcomes of psycho – social functioning of children with ID (Eisenhower et al., 2007; Hastings & Brown's, 2002).

Since the canonical analyses confirmed that school achievement and discipline of students are positively associated with their *cooperativity and self control* at school, and negatively with *emotional problems*, it brings to the fact that weaker *cooperativity and self control* of students with mild ID in secondary school are associated with their weaker general achievement and discipline in secondary school than in primary school, which is a risk factor of *emotional problems.* In the other side, better *cooperativity and self control* of TD students in secondary than in primary school contributes to their better academic success and discipline, as well as to the prevention of *emotional problems* at secondary school age. Consequentially, regardless of intellectual status as well as whether it is special or regulary school, *cooperativity* and better *self control* in school context are the predictors of better school achievement and discipline of students. It is evident that cooperative behaviour and adequate self-control are associated with academic relevant forms of behaviour which contribute to the process of teaching and learning, i.e. better school achievement (Wentzel, 1993). For instance, students with adequate self control, in situations when they cannot solve a cognitive task, and who are persistent in their intention to solve the problem, achieve significantly better school results than students who cannot control their emotional conduct (Wentzel et al., 1990). Emotional disturbance, as a consequence of such a conduct, disables them to direct their attention to solving tasks. Studies of samples of students with ID also confirm that, beside other indicators, the level of development of self regulation significantly correlates with the quality of school achievement (Agran et al., 2002; Agran et al., 2008). In studies of samples of students with ID, the results confirmed that in students with mild ID the level of self regulation is better than in students with moderate ID, and which is significantly positively associated with better average school achievement (Kaljača & Dučić, 2016). In other words, what level of cognitive development is lower it has stronger influence on self control ability and both influence academic achievement.

Integrating the mentioned findings with our results, we can conclude that cognitive limitations of students with mild ID limit their abilities to overcome more complex and higher educational tasks when transferring from primary to secondary school which manifests in weaker school achievement than in primary school. It is logical to assume that failure which leads to frustration has influence on lower *self control and cooperativity* of students. In other words, although these are special schools, it is possible that the methods and contents of work are not adjusted to students, i.e. attitude of teachers and inadequate support in adaptation to new and differently structured school environment contribute to lower *cooperativity and self control* of students with mild ID in secondary school, resulting in weaker school achievement. Negatively graded students more rarely interact with teachers, therefore relation of teachers towards students can, at a certain extent, explain this interrelation. In addition to the mentioned facts are researches that confirm interaction of teachers with students with ID is characterized by more conflicts and less closeness than with TD students, and also that, regardless of behaviour problems, the lack of social skills of students is significantly associated with worse relationships teacher – student (Eisenhower et al., 2007). Blacher and associates (Blacher et al, 2009) point out that the relationship teacher – student is reciprocal, and depends on the characteristics of teachers and school context. Authoritative style of a teacher, mental health problems and lack of emotional support are considered as the significant predictors of worse interrelationship teacher – student (Buyse et al., 2008; Hamre & Pianta, 2004; Hamre et al., 2008; Pianta et al., 2005). This finding is in accordance with the study of teacher exhaustion, where behaviour problems of children are in relation with emotional tiredness of teachers (Hastings & Brown's, 2002). It is also in accordance with the findings that stress of parents of children with intellectual disability results more in their behaviour problems and social skills deficit than to intellectual disability (Al-Yagon & Mikulincer, 2004; Baker, et al., 2003; Green & Baker, 2011; Fenning, et al., 2011; Jelić & Stojković, 2016b; Neeceet al., 2012). Other researches also confirm that teachers' treat children with ID worse than they treat children of TD (McIntyre et al., 2006) not because of their cognitive limitations but because of their frequent behaviour problems and lower level of development of social skills (Blacher et al, 2009). The skill of self regulation has a special place, which is fundamental in social skills and behaviour problems, and these variables also represent predictors of quality of teachers' relations both to typical and students with ID (Decker et al., 2007). Numerous researches of quality of relations of teachers and students of typical development confirmed that closeness and cooperation with teachers contribute to decrease of aggressive behaviour (Silver et al., 2005), as well as that students with fewer conflicts and with better relationship with teachers participate more in various school activities and have better school achievement (Birch & Ladd, 1997, Peisner-Reinberg et al., 2001). Furthermore, it is well known that teachers are more inclined to students who are cooperative and adaptable to school regulations and they treat them more positively than they treat students who are uncooperative and who inadequately react to demands of authorities.

The fact that *self control and cooperativity*, as well as the school achievement, of students with ID is better in primary than in secondary school, in accordance with general findings, points at more quality relationship of teacher – student in primary than in secondary school. On the other hand, we have already stated that expressed cooperativity of children with ID is explained in literature as their greater need, than the need of TD children, to meet the expectations of their parents and teachers in order to confirm their competence. From that point of view, another possible explanation of lower *cooperativity and self control* of students with mild ID with teachers at secondary school age can be also explained because of their need for acceptance by the peers, who gradually become more important than the adults. Since the criterion of peer group do not include extreme attachment to adults, it can be concluded that worse *cooperativity* *and self control* of young people with mild ID with teachers at secondary school age is motivated by their need to be accepted by peers.

Our findings confirmed that students with mild ID have significantly more *problems with peers* than typical students have. Researches in the field of peer relations of children with ID (Guralnick, 1999; Guralnick, 2001; Guralnick et al., 2006) point to the connection of *behaviour problems* of young people with mild ID and their *problems with peers*. The same as with the population of TD (Dodge et al., 2003), unacceptable behaviour leads to rejection by the peers and the frustration caused by rejection reciprocally causes aggressive, impulsive reactions making a vicious circle. Since in children with ID their disability and problems caused by cognitive limitations attract attention by themselves and often cause negative reaction and rejection by environment, it additionally enforces and enlarges their perception of themselves as the different ones (Dagnan & Waring, 2004; Dagnan, Jahoda, 2006). The experience of an intensive and permanent stigmatization which leads to feeling of inferiority and hostile intentions (Leffert & Siperstein, 2002) are manifested by emotional and/or behaviour problems. In accordance with the mentioned facts, our finding about more *behaviour problems* of student with mild ID than of the TD students can also be associated with negative treatment of the environment, especially of peers towards the young people with mild ID. Without denying that cognitive limitations enforce the risk of proper social perception and ability of adequate reaction, the authors point out that both characteristics of social situation and individual characteristics determine abilities and limitations of an individual to react and assess socially in a proper way (Leffert et al, 2010). According to that, our findings confirmed that with a greater school experience *behaviour problems* of students with mild ID, as well as the student of TD, are significantly lower. We assume that at younger age the frustration caused by negative treatment of environment brings reactions of children with mild ID to unacceptable, aggressive forms of behaviour, but gradually, because of their need for acceptance and attention from teachers and peers, young people with mild ID adapt their behaviour to social expectations what manifests in decrease of *behaviour problems.* In favour of the mentioned are the results on the same sample (Jelić, 2016) which showed that at younger age young people with mild ID more often apply domination in solving conflicts between peers than students of TD, but at older age there are no significant differences between young people with mild ID and the typical ones on the scale of domination. On the other hand, close to our results, it has been shown that regardless of age, students with mild ID significantly more often choose cooperative solving of problems and compromise in conflicts between peers than the students of the TD. It implies that cognitive deficits do not limit the ability of constructive, cooperative solving of conflicts of students with mild ID. However, although with greater experience of peers' interaction they use violent tactics more seldom, young people with mild ID more often yielding and avoidance in inter peer conflicts than their typical peers. Other findings confirmed that children with mild ID are rejected by peers even when they are shy and withdrawn (Frederickson & Furnham, 2004), while the children of typical development are primarily rejected because of behaviour problems and aggression. Being perceived as incompetent by their typical peers, children with ID gradually lose their self confidence, withdraw and they are more directed to adults. Taking in to account that lower grade of interactions with peers and unsociability at adolescent age can be one of the indicators of emotional problems, it strengthens our assumption that, together with other environmental factors, permanent *problems with peers* (rejection, victimization, lower interactions with peers), can be an explanation to more *emotional problems* of the young with mild ID at the older age.

All the mentioned implies that the mechanisms and processes associated with the outcomes of social and academic functioning of the young with mild ID are the same as of their TD peers, what has been confirmed by the findings referring to gender. Regardless of intellectual status, it has been confirmed that girls have more developed *social skills* which are basic in *prosocial behaviour* and they express *behaviour problems* more seldom than boys, what is associated with better graded discipline and school achievement of girls than boys. According to this, boys, both TD and with mild ID, are the group at more risk for behaviour problems, i.e. learning social skills and prosocial behaviour, and therefore academic achievement.

Conclusions and implications

Starting from the model of social competence which implies review of social competence through development of social skills and outcomes of social functioning, the findings confirmed that there is no significant difference in development of *social skills and prosocial behaviour* between students with mild ID and TD peers. On the other hand, there has been found that students with mild ID have significantly more difficulties in all *aspects of social functioning* than TD students. Low effect of intellectual status on difficulties of *social functioning*, with theoretical and empirical basis of interactions of environmental factors and cognitive limitations, lead to the conclusion that environmental variables have stronger influence on difficulties in social functioningof students with mild ID than their cognitive disability itself. Because of their disability the treatment of environment towards children and young people with mild ID is worse than towards TD children. The moderator effect of intellectual deficit on the outcomes of social functioning of students with mild ID implies that in order to prevent *behaviour problems, emotional problems and problems with peers,* early interventions should be primarily focused on parents, teachers and peers, and not only on child. Considering the connection between social and academic competence, similar implications have been obtained referring to educational characteristics of students.

Related to school context it has been confirmed that of all social skills, adequate *self control and cooperativity* represent significant criteria for assessment of academic achievement both in special and in regulary schools. It has been concluded indirectly that the preferences of teachers, i.e. the quality of relationship teacher – student, represent mediator variable between the mentioned social skills of students and the assessment of their school achievement. In accordance with this is the finding that, regardless of intellectual status, weaker developed *social skills* and more frequent *behaviour problems* of boys than girls are associated with their weaker school achievement comparing to girls. Together with the finding of significant connection of weaker school achievement with *emotional problems* of students, the analysed results suggest that neither special nor ordinary schools are directed towards social – emotional development of students, but only to possibility of realization of teaching program and acquiring of knowledge for its own purpose, and less to the knowledge as the means of a person's development. It implies that, in order to prevent school failure, through the teaching process teachers should support all aspects of student's personality and pay more attention to development of their *cooperativity* and better *self control* through building relationships of trust and partnership, a different organization of class work and more frequent application of cooperative learning, as well as rewarding of hard work and efforts of weaker students.

The findings confirmed the thesis of association between social and academic competence, but also in order to understand the process of learning and school achievement better, the future researches should be more directed towards characteristics of teachers and the quality of relationship teacher – student, than to studies of motivational and self – regulative processes in students. This is especially relevant to students with mild ID. The analysed findings imply that, entering the secondary level of education, students with mild ID are more risky group for weaker school achievement than students of typical development, not because of their cognitive deficit, but because of the negative school experience which, in interaction with weaker *self control and cooperativity* of students with mild ID leads to a vicious circle of inadequate relationship teacher – student and school failure. The fact that cognitive deficits are not limiting factors of learning social skills and prosocial behaviours of students with mild ID, as well as that learning according to the model is of a key importance to children with cognitive limitations, implies that schooling of children with mild ID in the same environment with their TD peers could have better effects on the outcomes of their social and academic functioning than in an exclusive environment with peers of similar or lower level of intellectual development. Of course, it includes adequate support of teachers and parents, and also positive attitudes of typical peers towards them.

Although our research is of correlative nature in basis, significant interactions of intellectual status and social experience and theoretical foundation of the existence of interactions, suggest moderator effect of intellectual status on mediator connection of performing social skills, environmental factors and outcomes of social functioning. Taking into consideration the connection between academic and social competence, future researches should be directed to examining of quality of relationship of teachers, parents and peers towards children and young people with ID and their connection with different indicators of social and academic competence of students. The effects of moderation can be integrated into even wider analytical procedures, similar to those which test moderation and mediation simultaneously, since the two kinds of effects often cannot be divided easily in empirical material. Methodological limitations of this research also refer to imperfection of the implemented instruments. The scale *problems with peers* measures various constructs of peer relationships (victimization, rejection, withdrawn behaviour) what makes us assume that findings related to this aspect of social functioning of children are not convincing. Since the performing of social skills, and especially *self control and cooperativity*, depending on the type of interaction, imply that the instruments that measure performing of social skills in various types of interaction (with peers, parents, teachers), as well as various sources of assessment, contributed to more precise findings.

Regardless of the mentioned limitations, the results of this research confirmed the theoretical starting point according to which the assessment of social competence cannot refer only to the singly indicators or a set of specific social skills, but it has to be analysed as an organized system of behaviour, including individual, motivational and environmental factors. Hence it was confirmed that it is also relevant to students with ID, theoretical, methodological and practical implications of this research are even of a greater importance. The findings can be used as a starting point for future researches of social competence both of students of TD and of those with ID.

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APPENDIX

Table 6 *Average values on scales SSRS and SDQ by age and intellectual status of students*

	Age	*Intelligence status*	*M*	*SD*	*N*	*School*	*Intelligence status*	*M*	*SD*	*N*
COOPERATIVITY	Lower	Mild ID	13.52	4.83	25	Lower	Mild ID	14.09	4.79	45
		Typical	11.48	4.98	61		Typical	11.48	4.98	61
		Total	12.07	5.00	86		Total	12.58	5.04	106
	Higher	Mild ID	13.55	4.34	51	Higher	Mild ID	12.74	3.92	31
		Typical	13.71	4.15	69		Typical	13.71	4.15	69
		Total	13.64	4.22	120		Total	13.41	4.09	100
	Total	Mild ID	13.54	4.47	76	Total	Mild ID	13.54	4.47	76
		Typical	12.66	4.68	130		Typical	12.66	4.68	130
		Total	12.99	4.61	206		Total	12.99	4.61	206
ASSERTIVENESS	Lower	Mild ID	14.72	4.33	25	Lower	Mild ID	14.07	4.09	45
		Typical	12.97	3.98	61		Typical	12.97	3.98	61
		Total	13.48	4.14	86		Total	13.43	4.04	106
	Higher	Mild ID	12.96	4.15	51	Higher	Mild ID	12.77	4.46	31
		Typical	13.55	4.29	69		Typical	13.55	4.29	69
		Total	13.30	4.22	120		Total	13.31	4.34	100
	Total	Mild ID	13.54	4.26	76	Total	Mild ID	13.54	4.26	76
		Typical	13.28	4.14	130		Typical	13.28	4.14	130
		Total	13.38	4.18	206		Total	13.37	4.18	206
SELF CONTROL	Lower	Mild ID	13.56	5.13	25	Lower	Mild ID	13.31	4.88	45
		Typical	12.56	4.51	61		Typical	12.56	4.51	61
		Total	12.85	4.69	86		Total	12.88	4.66	106
	Higher	Mild ID	11.98	4.22	51	Higher	Mild ID	11.32	3.84	31
		Typical	14.19	4.05	69		Typical	14.19	4.05	69
		Total	13.25	4.25	120		Total	13.30	4.18	100
	Total	Mild ID	12.50	4.56	76	Total	Mild ID	12.50	4.56	76
		Typical	13.42	4.33	130		Typical	13.42	4.33	130
		Total	13.08	4.43	206		Total	13.08	4.43	206

	Age	*Intelligence status*	*M*	*SD*	*N*	*School*	*Intelligence status*	*M*	*SD*	*N*
RESPONSIBILITY	Lower	Mild ID	14.52	4.30	25	Lower	Mild ID	14.64	3.93	45
		Typical	13.72	4.25	61		Typical	13.72	4.25	61
		Total	13.95	4.25	86		Total	14.11	4.12	106
	Higher	Mild ID	14.39	3.55	51	Higher	Mild ID	14.13	3.59	31
		Typical	15.04	3.66	69		Typical	15.04	3.66	69
		Total	14.77	3.61	120		Total	14.76	3.64	100
	Total	Mild ID	14.43	3.78	76	Total	Mild ID	14.43	3.78	76
		Typical	14.42	3.99	130		Typical	14.42	3.99	130
		Total	14.43	3.90	206		Total	14.43	3.90	206
PROSOCIAL BEHAVIOUR	Lower	Mild ID	6.88	2.81	25	Lower	Mild ID	7.16	2.67	45
		Typical	7.28	2.09	61		Typical	7.28	2.09	61
		Total	7.16	2.32	86		Total	7.23	2.34	106
	Higher	Mild ID	7.27	2.28	51	Higher	Mild ID	7.13	2.15	31
		Typical	7.45	2.08	69		Typical	7.45	2.08	69
		Total	7.38	2.16	120		Total	7.35	2.10	100
	Total	Mild ID	7.14	2.45	76	Total	Mild ID	7.14	2.45	76
		Typical	7.37	2.08	130		Typical	7.37	2.08	130
		Total	7.29	2.22	206		Total	7.29	2.22	206
EMOTIONAL PROBLJEMS	Lower	Mild ID	2.84	2.11	25	Lower	Mild ID	3.40	2.37	45
		Typical	3.79	2.38	61		Typical	3.79	2.38	61
		Total	3.51	2.34	86		Total	3.62	2.38	106
	Higher	Mild ID	3.82	2.23	51	Higher	Mild ID	3.65	2.02	31
		Typical	1.90	1.92	69		Typical	1.90	1.92	69
		Total	2.72	2.26	120		Total	2.44	2.10	100
	Total	Mild ID	3.50	2.23	76	Total	Mild ID	3.50	2.23	76
		Typical	2.79	2.34	130		Typical	2.78	2.34	130
		Total	3.05	2.32	206		Total	3.05	2.32	206
BEHAVIOUR PROBLEMS	Lower	Mild ID	3.52	1.41	25	Lower	Mild ID	3.60	1.28	45
		Typical	2.84	1.57	61		Typical	2.84	1.57	61
		Total	3.03	1.55	86		Total	3.16	1.50	106
	Higher	Mild ID	3.16	1.25	51	Higher	Mild ID	2.81	1.22	31
		Typical	2.13	.90	69		Typical	2.13	.90	69
		Total	2.57	1.17	120		Total	2.34	1.05	100
	Total	Mild ID	3.28	1.31	76	Total	Mild ID	3.28	1.31	76
		Typical	2.46	1.30	130		Typical	2.46	1.30	130
		Total	2.76	1.36	206		Total	2.76	1.36	206

PROBLEMS WITH PEERS	Lower	Mild ID	5.04	1.17	25	Lower	Mild ID	5.02	.96	45
		Typical	4.75	1.39	61		Typical	4.75	1.39	61
		Total	4.84	1.33	86		Total	4.87	1.23	106
	Higher	Mild ID	5.14	1.13	51	Higher	Mild ID	5.23	1.35	31
		Typical	4.55	1.06	69		Typical	4.55	1.06	69
		Total	4.80	1.12	120		Total	4.76	1.19	100
	Total	Mild ID	5.11	1.13	76	Total	Mild ID	5.11	1.13	76
		Typical	4.65	1.23	130		Typical	4.65	1.23	130
		Total	4.82	1.21	206		Total	4.82	1.21	206

ROLE OF CRIMINAL LAW OF SERBIA IN PREVENTION OF FAMILY VIOLENCE

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SUMMARY

The question is asked what the possibilities of criminal law in prevention and suppression of family violence are. Article 42 of the Criminal Code starts from relative theory and determines the purpose of punishment as special and general prevention. Special prevention is underlined also within security measures as a type of criminal sanctions which can be ordered for family violence as well. Analysing the penal policy of the legislator and courts, we have made an attempt to determine if the purpose has been achieved of prescribing a criminal offence of family violence. As pointed out in a part of theory ratio legis of this incrimination was to provide complex criminal law protection. However, taking into account the reaction and response of the competent authorities to family violence, and after the analysis of primarily court penal policy, we express a certain degree of scepsis regarding the reasons set forth as the reasons the legislator was guided by when incriminating family violence. It is therefore clear that general and special prevention goals that the penalty implies are not accomplished either, and this clearly and undoubtedly results from the legal text. The fact that this phenomenon draws the attention of the public increasingly suggests that the legislator was mostly guided by certain populist-political reasons rather than the true analysis which determines the need to incriminate family violence as a separate criminal offence.

Key words: criminal law, family violence, special and general prevention, court determination of penalty, legal determination of penalty

INTRODUCTORY REMARKS

Criminal law as a branch of positive legislation is based on fundamental principles which represent the achievements of contemporary legal systems. Under the conditions in which rule of law functions implying fully achieved principles of legality, in other words that law is binding not only upon an individual but upon the state as well, this means legal safety, limitations and control of state coercion by law. Therefore, the principle of rule of law is the foundation on which the "house" is built in which its members put trust. What are the requirements that principle of rule of law sets before the criminal legislation? In regard to the principle of legality, the requirement to determine criminal law norms is of special significance for achieving the rule of law, as well as the basic rule that criminal legal intervention should be reduced to necessary minimum in order to protect the most important goods which cannot otherwise be protected (Стојановић, 1991: 28). This means that criminal law and its provisions, although very useful in fighting against contemporary forms of crime, have limited character, which after all results from the basic characteristics of criminal law suggesting that it is of accessory, fragmentary and subsidiary character. It protects legal goods which have already been constituted and determined by other branches of law and only from certain forms of attacks on them. When it concerns family violence, in our country it is classified in the group of offences relating to marriage and family. The object of protection of this group are marital and family relations.[a]

Normative regulations of marital and family relations primarily mean the application of corresponding constitutional-law, family-law, civil-law and administrative relations. Subsidiary, marriage and family are protected by criminal law (Стојановић и Делић, 2013:94). Therefore, criminal-law intervention should be the last resort, *ultima ratio*and should not be used until there exist other means and manners to protect some good. When it concerns the legal protection from family violence, Family law is *prima ratio*. Marital and family relations belong to the sphere of interpersonal relations and criminal-law protection is used with "ultimate restraint" (Стојановић, 2012: 559). Thus, for instance, for some criminal offences it is prescribed that certain individuals will not be punished although the important specific elements of crime have been accomplished because the criminal offence does not exist. Criminal law has always very carefully regulated criminal-law protection in the sphere of family relations (Вуковић, 2012:127). However, in some cases it is necessary to respond with criminal-law provisions, since it is the question of the most important social values. When protection from family violence is concerned, the logical question is if it concerns the most important good since there exists parallel protection of family law and criminal law. This is why in theory it is stated with good reason that in this way the idea of the need for protection from family violence is compromised (Шкулић, 2012:79).

The theory puts forward the standpoint that penal-law protection from violence is more or less fragmentary and that it mostly boils down to the protection from unlawful assaults on life and bodily integrity, serious assaults on psychic integrity and violation of basic human freedoms by applying coercion (Симеуновић-Патић, 2015:18). When it concerns criminal-law protection, we point out that one of the main characteristics of criminal law is its fragmentary character, that criminal law regulates heterogeneous social relations but only partially and fragmentary. Criminal law offers protection

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[a] This would meand that family violence also protects family relations, but the question is if it protects only the family relations or the family members as well. Milan Škulić claims that when we analyze a little bit closer the elements of a concrete criminal offence, it can be observed that its object of protection, in other words the *protected object*, is not family as such, but a *family member*. See: М. Шкулић, "Основни елементи нормативне конструкције кривичног дела насиља у породици – нека спорна питања и дилеме", текст у зборнику "Насиље у породици" (ур. М. Шкулић), Удружење јавних тужилаца и заменика јавних тужилаца Србије, Београд, 2009, стр.11.When the defendant undertook in relation to every family member the acts each of which separately contain the elements of criminal offence of family violence, at the same time and at the same place under the same circumstances and with the same purpose due to which they make one natural unity and entity, then all separate acts the defendant undertook against the injured parties are just physical parts of one behavior of the defendant as a factual complex whose criminal-law content is exhausted in the legal qualification of criminal offence of family violence, taking into account that the object of criminal-law protection in this concrete case is primarily family as a social good and then indirectly its members as well (Judgment of District Court in Užice, Kž*. 143/2007 dated March 26, 2007).*

only to certain values, in other words the most valuable ones, and not to all the good and just from the most dangerous forms of attack on them. This is why the remark referring to fragmentary character of criminal-law protection, as a form of penal-law protection, is unacceptable since criminal law protects only in those segments where the protection offered by other branches of law, for instance civil and family law, is not sufficient. Excessive aggressiveness expressed through the wish to intervene in every sphere of social life and with detailed criminal-law regulations would essentially violate partiality of criminal-law protection.

We would not go in further details here regarding legal-dogmatic analysis of the Criminal Code provision which refers to family violence. We will point out that it was introduced in the criminal-law system of Serbia as a separate criminal offence in March 2002.[b] Had the family members been unprotected before that? Of course they were not. There exists even now, as it existed then, the entire series of criminal offences that "cover" very nicely every element of incrimination of family violence. Also, the manner in which criminal offence of family violence found its place in the Criminal Code tells us a lot about the quality of the incrimination and the need for its existence within the Criminal Code. It entered as an "amendment", and not according to "regular", i.e. "normal" procedure, which as a rule still implies considerably higher level of quality when formulating concrete incrimination (Вуковић, 2012:128). Exceptional lexical vagueness of the term violence and its imaginative character suggest that from the criminal-law standpoint it is almost impossible to precisely determine this concept. After all, this is not a criminal-law but criminological, and in a wider sense, sociological concept. Despite the fact that it is used in several places within the Criminal Code of Serbia, it is clear that its precise criminal-law definition is not possible to get. This is why in all criminal offences where it is used this term is dubious from the aspect of the principle of legality and its *lex certa* segment. However, we can only briefly point out that here the tendency to spread criminal-law repression has also come to the fore. It is true that many legislators are inclined to criminal-law interventionism. But in the nearest future this could lead to the legitimacy crisis of criminal legislation.

It is justified then to ask the question if *ratio legis* has been fulfilled for incrimination of family violence. As pointed out in theory, this is protection of family and family relations, but also reinforced protection of certain categories of persons, primarily women and children from another family member who exerts to violence, i.e. the protection of special relation of trust among the family members, since it is emotionality that characterizes daily family relations, and therefore violence represents deviation from that condition characteristic for family and family relations.

If this has really been accomplished will be seen after the analysis of legislative and court penal policy.

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[b] Закон о изменама и допунама Кривичног закона РС, Службени гласник РС, бр. 10/2002.

Legislator’s penal policy and prevention of family violence

We shall pay special attention to two questions related to penal policy. First, what the penal policy of courts is concerning criminal offence of family violence in our criminal legislation, and second, if the scopes of penalties existing in our criminal legislation leave enough possibilities for the proportionate and justified criminal sanction to be determined in the procedure of individualization, taking into account the concrete criminal offence committed and the personality of offender. It is clear that in addition to the legislator penal policy is led by the courts. Namely, the legislator is the one who determines the basic general solutions: what actions are considered criminal offences, determines criminal sanctions to be applied, maximum and minimum measures of certain sanction, i.e. determines the types of punishment and their lowest and highest extents. On the other hand, there is the penal policy of courts which have a wide space for free decision-making, both regarding the selection of the type of criminal sanction and determination of penalty (Стојановић, 1991:74). When it regards legislator’s penal policy, our country belongs to the group of countries that have separate incrimination of family violence.

Criminal-law approaches to solving the problem of family violence, observed from comparative law point of view, are various. There are several possible manners to punish family violence. The **first** one includes the countries that offer protection with the existing incriminations that are part of the entire criminal legislation in the concrete country. Thus, for instance, the *German Criminal Code* does not contain special provisions on family violence, which does not mean that there is no family violence in Germany. According to the governing opinion in Germany, family violence is covered by the rules of other criminal offences so that it is not necessary for it to be separated as a special incrimination (offences against life and limb, freedom and rights, sexual freedom, and so on). When admeasuring the penalty, the fact that an offence has been committed against a family member can be taken into account particularly. Pursuant to § 46 when sentencing the court shall weigh the motives and aims of the offender and the degree of force of will involved in committing a crime.[c] The *Criminal Code of the Russian Federation* (Papor, 2013: 253-263), also does not recognize family violence as a separate criminal offence. Each act with elements of violence committed against a family member is qualified according to the existing provisions of the Criminal Code, for instance Article 111 of the Criminal Code of the Russian Federation (Intentional Infliction of a Grave Injury). In the Criminal Code of the Russian Federation, within the Section titled “Crimes against the Person”, it is possible to find the appropriate incrimination and qualify the acts directed, for instance, against women in a family, elderly people, and children. Thus, Article 117 of the Criminal Code of Russian Federation (Torture) covers also the responsibility for family violence which consists of “the infliction of physical or mental suffering by means of systematic beating or by any other violent actions, unless this has involved the consequences referred to in Article 111 – Intentional Infliction of a Grave Injuryand Article 112 – Intentional Infliction of Injury to Health of Average Gravity.

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[c] Кривични законик Савезне Републике Немачке, Центар маркетинг, Београд, 1998, стр. 25.

The second possible manner to suppress family violence implies introduction of special indictable offences within some criminal offences, which, as a rule, are typical crimes with elements of violence. This manner is the most acceptable from the standpoint of the principle of legality, since all crimes containing the term violence can be criticized regarding the *lex certa* segment. Such a solution, for instance, is in the *Criminal Code of Macedonia*,[d] the *Criminal Code of the Kingdom of Spain*[e] and the *Criminal Code of the Swiss Federation*,[f] and until recently the *Criminal Code of Croatia*. The *Criminal Code of the Swiss Federation*[g] does not prescribe a separate offence of family violence, but incrimination of family violence is made through various offences (for instance Article 123 – Common Assault, Article 126 – Acts of Aggression, Article 180 – Threatening Behaviour), where prosecution *ex officio* is prescribed, which in a way makes the position of the victim easier. In Article 147 of the *Criminal Code of the Kingdom of Spain*, there is a crime that consist of causing injury, and in Article 148 it is pointed out that the injuries foreseen in Section 1 of the preceding Article may be punished with a sentence of imprisonment of two to five years, if, among other things, the victim is under twelve years old or is incapacitated (Section 3), if the victim is or has been the wife, or woman bound to the offender by a similar emotional relation, even when not cohabitating (Section 4), or if the victim is an especially vulnerable person who lives with the offender.

The **third** manner to regulate family violence implies introduction of separate incrimination into criminal legislation, which is the case with our country as well (*the Criminal Code of the Republic of Croatia, The Criminal Code of Republika Srpska, The Criminal Code of the Republic of Montenegro, The Criminal Code of the Republic of Slovenia, The Criminal Code of the Kingdom of Norway, The Criminal Code of the Kingdom of Sweden).* In the countries where such a solution exists it is mostly criticized because it causes great difficulties in practice due to its ambiguity. This is the result of rashness, unprofessional translations and the method of direct transfer of certain provisions of international agreements, which has done a lot of harm to the coherency of legal system. It can very often be found in other countries in the region that specific elements of new criminal acts are not adapted to national terminology and general institutes or that they often contain unclear and wide formulations. Further, what is more important, wide and unprecise formulations can compromise one of the basic principles of criminal law – *nullum crimen nulla poena sine lege* (Коларић, 2015:18).

In order to better understand the table that follows, we shall say once again that family violence as a separate crime was introduced in the criminal-law system of our country in 2002,[h] by the amendments and additions to the Criminal Code of the Republic

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[d] Кривичниот законик, *Службен весник на Република Македонија*, бр. 37/96, Закон за изменување и дополнување на Кривичниот законик, *Службен весник на Република Македонија*, бр. 80/99, 4/02, 43/03, 19/04, 81/05, 60/06, 73/06, 7 /08, 139/08, 114/09 година, 51/11, 135/11, 185/2011, 142/2012, 166/2012, 55/2013.

[e] Ley Orgánica 10/1995, de 23 de noviembre, del Código Penal (Vigente hasta el 28 de Octubre de 2015), http://noticias.juridicas.com/base_datos/Penal/lo10-1995.html 10.10.2015.

[f] http://www.admin.ch, 05.10.2015.

[g] Code pénal suisse http://www.admin.ch, 05.10.2015.

[h] Законо изменама и допунама Кривичног закона РС, Службени гласник РС, бр. 10/2002.

of Serbia.[i] Article 118a – Family violence – was added in the group of criminal offences against marriage and family. This does not mean that until then the violence against family members was not punished by our legislation. It was possible to apply many other classic incriminations to the perpetrators of such crimes, and the fact that violence was committed against a family member could be taken as aggravating circumstance. Entry into force of the Criminal Code[j] on January 01, 2006, brought changes both of the specific elements of crime and the penalties prescribed.

Table 1 *Prescribed penalties for criminal offence of family violence*

Article 194. FORM	Criminal Code (of September 2009)	Criminal Code (of January 01, 2006)	Criminal Code (of March 2002)
Paragraph1	From 3 months to 3 years	Fine or imprisonment up to 1 year	Fine or imprisonment up to 3 years
Paragraph 2	From 6 months to 5 years	From 3 months to 3 years	From 6 months to 5 years
Paragraph 3	From 2 to 10 years	From 1 to 8 years	From 2 to 10 years
Paragraph 4	From 3 to 15 years	From 3 to 12 years	Imprisonment of at least 10 years
Paragraph 5	From 3 months to 3 years and fine	Fine or imprisonment up to 6 months	

Although it can be seen from the above table that the legislator has twice amended the penal policy for this criminal offence in a short period of time (first the mild approach comes to the fore and then increased repression), it seems that satisfactory solutions have not been found. Namely, as it can be seen from Table 1, for grievous bodily harm inflicted negligently to a family member the offender shall be punished by imprisonment from two to ten years, and if the serious bodily harm during family violence is inflicted intentionally to a family member the offender shall be punished for the crime of "Serious bodily harm" pursuant to Article 121, paragraph 1, of the Criminal Code, where the penalty ranges from six months to five years, or paragraph 2, where the imprisonment is from one to eight years. To tell the truth, by the analysis of court practice we have determined that courts very often resort to qualification pursuant to Article 194, paragraph 3, not embarking upon the content of the offender's guilt. It remains unknown if they do this because of the lack of familiarity with substantive criminal law or because they want to impose a heftier sentence. One of the possible solutions to this problem *de lege ferenda* is prescribing more serious forms within the already existing incriminations, even for serious bodily injury from Article 121, if the offence was committed against a family member, whereas the penalty of imprisonment could stay the same as for Article 194, paragraph 3 of the Criminal Code, from two to ten years.

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[i] Кривични закон РС, *Службени гласник СРС*, бр. 26/77, 28/77 – испр., 43/77 – испр., 20/79, 24/84, 39/86, 51/87, 6/89, 42/89 и 21/90 и*Службени гласник РС*, бр. 16/90, 26/91-одлука УС Ј бр. 197/87, 75/91 – одлука УС РС бр. 58/91, 9/92, 49/92, 51/92, 23/93, &7/93, 47/94, 17/95, 44/98, 10/2002, 11/2002- испр, 80/2002-др закон, 39/2003 и 67/2003.

[j] Кривични законик РС – КЗ, Службени гласник РС, бр.85/2005.

Penal policy of courts and prevention of family violence

It was Seneca who in the appellate procedure to Plato expressed the classic lesson on prevention: "No sensible person punishes because a wrong has been done, but in order that a wrong may not be done" (*"nemo prudens punit, quia peccatum est, sed ne peccetur...*"). At that time, this thesis was at the forefront of forming independent theory on special prevention, which was later suppressed by theory of retribution (absolute theory on purpose of punishment – according to which the penalty is retribution, retaliation for the action done), but it was revived at the end of 19th century by sociological school which still has a huge influence (Roxin, 2006: 73-74).

Taking into account the system of criminal sanctions in our country, the manner in which the purpose of penalty and security measures has been determined clearly shows that our legislator puts prevention at the fore since he starts from the relative theory. It is important to determine at this place the successfulness of court penal policy when it concerns special, but also general prevention.

In the period from 2007 to 2014, the Public Prosecutor's office of Serbia acted upon 26,645 criminal complaints due to well-founded suspicion that the criminal offence of family violence had been committed, whereas in 14,270 cases it pressed charges, and in 11,925 cases (45% of all complaints) the decision was made not to prosecute.[k] In one research carried out at the territory of five respective Public Prosecutor's Offices (Vranje, Kraljevo, Smederevo, Sombor, Valjevo) in the period from 2010 to 2014, out of the total number of dismissed criminal complaints the Public Prosecutor's Office dismissed 26% after cancelling prosecution, i.e. due to application of the principle of opportunity (Марковић, 2015:480).

Within the same period (2007-2014) in Serbia the total of 273,139 persons were sentenced. Out of this number 22,518 persons were sentenced for criminal offences against marriage and family, and 12,234 persons for the criminal offence of family violence, i.e. 46% out of the number of criminal complaints. This means that within the total crime in the observed period family violence makes 4.5%, and in comparison with criminal offences against marriage and family it makes 54%.[l] It is an interesting fact also that the procedure ended without conviction in 17% cases after the charges were pressed for family violence. We must say that regarding punishment our attention was drawn by a relatively high rate of probations. This criminal sanction was imposed in 8,128 cases, which makes 67%. In the last three years of the observed period we have noticed that the number of suspended sentences was increasing. Thus in 2012, 970 suspended sentences were imposed, in 2013 there were 977, and in 2014 there were 1,041 suspended sentences.

When concerning criminal sanctions imposed for criminal offence of family violence (Table 2), the courts in our country imposed 3,110 custodial sentences in the period from 2007 to 2014. Out of this number the majority belongs to imprisonment up to 6 months, 1,996 or 64% out of the total number of sentences of imprisonment. The least represented were the sentences of 3 year of imprisonment and stricter (40 in total).

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[k] The data ofthe Statistical Office of the Republic of Serbia.

[l] The data ofthe Statistical Office of the Republic of Serbia.

In further analysis of this Table we see that fine was imposed 689 times, whereas it is interesting that the trend of imposing this penalty is decreasing. For the first three years of the analysed period (2007-2009), 505 were imposed, and for the last three years of the analysed period (2012-2014) only 54, in other words ten times less.

Table 2 *Adults sentenced for family violence in Serbia according to sanctions imposed in the period from 2007-2014*

		2007.	2008.	2009.	2010.	2011.	2012.	2013.	2014.	Total
Family violence – total		1312	1681	1850	1059	1616	1472	1532	1712	12234
Attempt		11	8	2	/	3	2	4	1	31
IMPRISONMENT	Total	239	300	372	236	360	436	533	634	3110
	Up to 2 months	26	33	39	22	16	26	17	28	207
	From 2 to 3 months	57	58	85	44	77	79	75	109	584
	From 3 to 6 months	89	106	134	82	123	166	243	262	1205
	From 6 to 12 months	49	71	80	59	97	116	139	166	777
	From 1 year to 2 years	12	20	22	21	31	31	30	44	211
	From 2 to 3 years	5	5	1	7	10	15	22	21	86
	From 3 to 5 years	/	1	4	/	5	3	5	3	21
	From 5 to 10 years	/	4	7	1	1	/	2	1	16
	From 10 to 15 years	1	2	/	/	/	/	/	/	3
Fine		148	186	171	55	75	33	8	13	689
Suspended sentence (imprisonment)		887	1162	1265	745	1135	970	977	1041	8182
Community service		1	/	3	4	23	15	7	14	67
Judicial admonition		19	20	26	8	10	9	1	4	97
Security measure of restraint order to approach and communicate with injured party		/	/	/	170	90	14	24	25	323
Rehabilitation measures		4	4	4	2	3	6	3	4	30
Convicted but not sentenced		14	9	9	9	10	3	3	2	59

From the total number of persons convicted for family violence 95% are males and only 5% females, whereas even 38% are repeat offenders (see Table No. 3).

Table 3 *Adults convicted for family violence in Serbia according to sex and previous convictions in the period 2007-2014*

Year		Total		
		Total	Female	Male
2007	Total	1312	58	1254
	Previous convictions	497	7	490
2008	Total	1681	75	1606
	Previous convictions	666	15	651
2009	Total	1850	111	1739
	Previous convictions	753	15	738
2010	Total	1059	55	1004
	Previous convictions	385	6	379
2011	Total	1616	81	1535
	Previous convictions	584	7	577
2012	Total	1472	76	1396
	Previous convictions	556	11	545
2013	Total	1532	81	1451
	Previous convictions	594	16	578
2014	Total	1712	98	1614
	Previous convictions	638	15	623
Total		12234	635	11599
Total previous convictions		4673	92	4581

Using the official statistics can be deceiving when doing scientific research. Namely, the dark figure of violence in family is high. In one of the studies it has been determined that the Ministry of Interior (MoI) of the Republic of Serbia in the first six months of 2015 had 12,147 reports referring to some form or type of family violence (it would amount to 24,000 reported incidents annually, which is equivalent to the number of criminal complaints processed by the Public Prosecutor's Office for family violence for a period of seven years). The MoI brought 2,174 criminal charges and 3,825 reports to Public Prosecutor's Office, as well as 1830 misdemeanour charges to the competent misdemeanour court for disturbing public peace and order (Марковић, 2015:459). These indicators tell us that a small number of reported incidents with elements of family violence in Serbia end with initiation of criminal procedure. Naturally, when doing the research it should take into account those criminal offences against family members which are not qualified as criminal offence of family violence but as some other offence (serious bodily injury according to Article 121 or murder according to Article 113, or aggravated murder according to Article 114 of the Criminal Code), but also these incidents where a family member was murdered and after that the offender committed suicide since these incidents cannot be seen in the official statistics.

Observing the penalty ranges for certain forms of family violence, taking into account that the system of relatively determined penalties is adopted in contemporary criminal legislations, it is difficult to say that the legislator makes some provisional determination of penalty *in abstracto*. The ranges are set wide so that we can claim, despite the fact that theory recognizes both court and legal determination of penalty, that only court determination of penalty is determination of penalty in the true sense of the word. However, our legislator has succumbed to the false belief that court practice can be influenced regarding stricter penal policy by prescribing stricter punishments.

Thus in 2009 by the amendments to the Criminal Code the punishments for all forms of family violence were tightened.[m] However, this has resulted in even deeper gap between prescribed and imposed punishments. The fact is that the courts, and not only for this type of crime, taking into account the penal ranges impose the punishments closer to the lower limit. The reasons can be numerous, but in theory one is pointed out to which special attention is given. This is the claim that the law prescribes Draconic penalties (Стојановић, 2015:302).

The European Court of Human Rights supports the view that the state is not only obliged to provide corresponding legal framework for the fight against family violence but should ensure its effective implementation and that international practice strongly suggests that criminal prosecution of family violence offenders should be carried out if there is sufficient evidence and even when the victim of violence withdraws criminal complaint or waives it. Thus in the case *Tomašić vs. Croatia*[n] and *Opuz vs. Turkey*[o] the court first of all unequivocally confirmed the positive obligations of the state referring to the protection of all persons under its government, those who suffer or could suffer violence or some other form or inhumane and humiliating treatment. The right to protection of the right to life and protection from torture belongs to peremptory legal norms, *ius cogens* and requires adequate state activities regarding investigation and criminal prosecution of such acts. It is the responsibility of the state to provide for efficiently conducted investigation and criminal prosecution of the offender. The court also clearly and unequivocally expressed the opinion that in the cases referring to death under the circumstances from which the responsibility of the state could result, the authorities must act on their own initiative as soon as they learn about the specific case. The court stated that incapability of the state to efficiently prevent gender-based violence represents a form of discrimination of women. The states are responsible if they fail with due attention to prevent violence against women, as well as to investigate, prosecute and punish such violence.

In addition to problems of imposing relatively mild penalties and suspended sentences, the duration of criminal procedure is also identified as a problem influencing both special and general prevention. In the research conducted at the territory of the town of Valjevo, we have come to the data that duration of a criminal procedure for family violence from the moment of reporting the incident to the moment when finally binding sentence is reached ranges between one year and six months to four years (Марковић, 2015:462). Many studies have shown that the victims of family violence find it difficult to decide to report violence and that they are discouraged when the charges are dismissed, in other words the longer the criminal procedure lasts the greater chance is that the victim would change the originally given statement and that they would give up criminal prosecution. One aspect of prevention is also an efficient criminal procedure.

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[m] Закон о изменама и допунама Кривичног закона РС, *Службени гласник РС*, бр. 72/2009.

[n] *Предмет Томашић против Хрватске*, Апликација бр. 46598/06, Пресуда од 25.01. 2009

[o] *Предмет Опуз против Турске*, Апликација бр. 33401/02, Пресуда од 09.06. 2009.

Significance of safety measure of restraint to approach and communicate with the injured party in special prevention of family violence

The amendments and additions to the Criminal Code from August 2009, a new security measure was introduced into Article 89a, which can be used to prohibit an offender from approaching and communicating with the injured party. It is *Restraint to approach and communicate with the injured party.* Not disputing the good intention of the legislator in the course of its introduction, the question was asked if due to its significance it deserved to be separate criminal sanction and how its efficient application was to be provided.

The situation somewhat resembles problematic situation with protective measures from the Family Law where we have got an upside down solution, and that is that their application is provided by the Criminal Code. To be fair, the efficient application of this security measure, as well as of some others, has not still been provided. What shall we do in a situation when the convicted person who has been imposed this measure violates its prohibition. Theory immediately pointed out that it would be better if the security measure was provided as one of the obligations within protective surveillance under which the offender can be put who has been imposed suspended sentence, in which case there would exist a possibility to revoke suspended sentence if he does not fulfil this obligation (Стојановић, 2012: 331).

The purpose of this security measure is to eliminate conditions for repeated commission of a criminal offence of family violence in that way that the offender is prevented to further harass a concrete person, an injured party. Imposing some other criminal sanction, in addition to security measures, will underline negative assessment of his behaviour by the court and influence other persons to follow after his example (Ковачевић, 2014: 50).This means that the security measures by their nature represent criminal sanctions which first of all serve special-preventive function, all the more that social-ethical reproach to offender here is in the background, while eliminating danger of repeated criminal offence is priority (Стојановић, 2015: 335-336). Punishment must never be imposed (or not imposed) for special prevention only, while this is the rule for security measures. The reason why security measures exist even today is the same as at the time they originated, and that is not to overburden punishment by special-preventive tasks and that the basis for imposing punishment must not be the danger of the offender.

This security measure, as we have seen, takes a significant place among the imposed criminal sanctions for the criminal offence of family violence. However, the fact remains that in its defining the terms are used which should at least be roughly determined, and these are: "specified distance", "area surrounding the injured party's residence or place of work", "further harassment of the injured party, in other words further communication with the injured party".

At this point it is important to underline that work on new amendments and additions to the Criminal Code is in progress. The current version of the preliminary draft Law on Amendments and Additions to the Criminal Code introduces a new criminal offence (Article 340a of the Criminal Code), the goal of which is to provide sanction for violation of prohibition contained in certain security measures. According to the Code currently in force, there are no sanctions for violation of certain prohibitions contained in some security measures (if the convicted person keeps approaching the injured party at a certain distance). When violating other prohibitions, certain sanction reflects in that the court, when imposing suspended sentence, can determine that it will be revoked if the convicted person violates the prohibition ordered by the security measure (Articles 85 and 86 of the Criminal Code). However, even with these security measures there is a need for one such criminal offence in case the sanction with which the security measure is imposed is not suspended sentence.

Special Protocol for Judicial Bodies in Cases of Domestic and Intimate Partner Violence against Women[p] stipulates that courts would pay special attention when imposing security measures for criminal offences in which the victim is a female. Thus taking care of special protection of the victim, most often a woman, the court will take care that the appropriate security measure is imposed on the offender taking into account the need to protect the victim so that the offender would not commit criminal offences against a female person in the future. When imposing a security measure of restraint to approach and communicate with the injured party, the court would particularly take into account social, economic, psychological and other factors in order for this measure to be implemented to protect the jeopardized, i.e. injured party.

According to the data of the Statistical Office of the Republic of Serbia, at the territory of the Republic of Serbia in the period from 2010-2014, final judgments imposed the total of 323 security measures of “restraint to approach and communciate with the injured party”. In Table 2, we have presented the measure imposed by the courts per years. We can see that in the first two years from its adoption the courts used this measure 260 times, and after that in the following three years only 63 times. The reasons why we shall rarely find it in court practice is that no sanction for its violation is provided, but also that the court must take account whether the convicted person has means to support himselft and if this measure could influence his existence. Thus, in the ruling of the Higher Court in Belgrade Kž1.No. 132/14 dated March 21, 2014, it says that “When deciding if to impose the measure of restraint to approach and communicate with the injured party (the defender’s wife), which includes prohibition to approach the area surrounding the place of residence, the court must take into account if the defendant has means of support and if the imposition of such measure could affect his existence. After finding VS in B., the court of first instance has acted properly when in the concrete case it has not accepted the request of the Public Prosecutor to impose on the defendent within the meaning assigned by Article 89a of the Criminal Procedure Code the security measure of restraint to approach to the injured party, or the area surrounding the place of residence and further harassment for the duration of 6 months, rightly taking into account that the defendant is unemployed and that he has not means of support, so that the imposition of such a security measure could influence his existence, and that the imposed penalty of a year and a long period of checking in this concrete case the purpose of punishment is achieved, therefore the opposite particulars of the Public

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[p] Посебни протокол за правосуђе у случајевима насиља над женама у породици и партнерским односима, Република Србија, Министарство правде и државне управе, Број: 119-01-00130/2013-05, датум: 14. јануар 2014. године, Београд.

Prosecutor have been assessed as unsupported."[q] In addition to this measure, the following measures are also significant that could be imposed by criminal judgment, and more than one can be imposed at the same time: *compulsory psychiatric treatment and confinement in a medical institution, compulsory psychiatric treatment at liberty, compulsory alcohol addiction treatment* and *compulsory drug addiction treatment*. We must point out that this is a specific criminal offence and that family members often suffer violence for years and do not report it because their relationship with the offender is emotional and they feel love towards the offender (father, son, daughter, etc.), and in many cases they also feel fear, compassion, but are also financially dependent. They decide to report family violence because they wish to help that family member (offender). In a large number of cases the injured parties request to talk to police officers or public prosecutor asking for advice what to do since they suffer family violence and do not want to harm that family member (the violent person). They ask the state organs to help them and find the way to treat the violent person (for instance, an alcoholic father abusing the family when he is under the influence of alcohol, whereas he refuses to be treated, or a drug-addicted son who is selling things from home in order to buy drugs and after that is violent against the family members in order to extort money to buy drugs, and similar). For such victims of family violence the primary goal is to put a stop to violence and the secondary is punishment which should be imposed on the offender, it is even undesirable, they just seek a way how to provide treatment to the offender to which he would not agree voluntarily. The victims rather decide to report violence in the family with the knowledge that there is possibility for imposition of these security measures. It is in the victim's mind that security measures are far better option than imprisonment, or suspended sentence or fine (as the worst option, since the violent persion is still free and can continue acting violently, and also must pay fine and judicial costs, which again are born by the family budget).

It is clear, therefore, that when deciding on the penalty for the criminal offence of family violence the court should take into account with due dilligence the fact that the defendant was previously convicted and that he commited a crime in the state of severe acute alcoholic intoxication, which suggests that it is a specific personality and that previously imposed criminal sanctions obviously did not achieve their purpose and had effect on him to stop commiting crime. Therefore, the court rightly decided when determining that there is no room for a suspended sentence, but imposed the imprisonment and the measure of mandatory treatment of an alcoholic since the crime was committed due to alcohol addiction and there was serious danger for the defendant that due to this addiction he would continue committing crimes.[r]

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[q] Билтен Вишег суда у Београду, број 85, Интермех, Београд, Приредили: мрА лександар Трешњев, судија Бојана Станковић, виши судијски сарадник. Пресуда Вишег суда у Београду Кж1.бр. 132/14 од 21. марта 2014. и пресуда Првог основног суда у Београду К.бр. 4337/13 од 10. фебруара 2014. године

[r] Judgment of Appelate Court (AS) in Kragujevac, Kž1. 1545/2010 date February 12, 2010.

Case study – method of analysis of certain cases of family violence

At the end of this part of the paper, and before the concluding considerations, in order to show what an unwanted outcome for the family members can happen due to an inadequate state organs' response to reported family violence, we shall do a case study which will show the speed and manners of response of state organs to reported family violence and penal policy of the court.

For easier monitoring of a case study the family members will be marked as follows: father AA (1946), mother BB (1945), son CC (1965) and daughter-in-law DD (1970). AA and BB lived in matrimony from 1964 to 2010, after which they divorced and continued to live in two separate houses within the same farmstead in the vicinity of Valjevo. Also, we shall use short marks for Appelate Court in Belgrade – AC, The Basic Court in Valjevo – OS, Police Department in Valjevo – PU, Basic Public Prosecutor's Office in Valjevo – OJT, Higher Public Prosecutor's Office in Valjevo – VJT, Emergency Room of the Valjevo Hospital – UC, Clinical Center in Belgrade – KC.

On September 23, 2015, emergency unit notified PU that responding to the call for urgent medical assistance they came to a farmstead near Valjevo and found a dead body (corpse of a man) in the house and an elderly male in front of the house with injuries on the head (scull) dangerous for life. The injured person was transported to the UC, and after that to the emergency department of the KC. The police secured the scene and the crime scene investigation was performed. It was determined that in front of the family house the son CC phisycally inflicted serious bodily injuries to his father AA by repeatedly hitting his head to the ground. When he thought that he had killed him, the son CC entered the house, wrote a suicide letter in which he confesed to commiting a crime and stated the reasons which can be described by the following words – he commited a crime because the whole family suffered violence by the father in the previous period. He then drank a poison (Kreozan – very toxic pesticide) and commited suicide. The autopsy confirmed that death was violent due to the poison he drank. There were no witnesses present. Father AA died on September 29, 2015, at the KC ward. VJT did not request autopsy because the offender committed suicide (Case No. Pu-2959/15 dated September 30, 2015).

Mother BB said that she was not present during the incident because she was shopping in Valjevo and that her former husband was violent against all family members for a number of years and that all such incidents had been reported to the police after which the criminal procedures were held in which AA was sentenced by the court.

In order to determine what preceded such a family tragedy when one family member – son, killed another family member – father, and if the crime was committed in the heat of passion or the long-term conflict between family members resulted in homocide, we shall have an insight into the court documents of final judgments.

On June 21, 2006, police filed a criminal complaint under no. KU-320/06 against a person AA because of grounded suspicion that he commited a criminal offence of family violence since in the first half of 2006, he used violence and threatened to attack on life and body in a family household, he endangered bodily integrity and peace of the members of his family in such a manner that he evicted and maltreated his wife – the injured party BB, and he did the same to his son CC and his daughter-in-law DD. In addition to this, he beat his son and attacked him with a knife, and on June 14, 2006, he approached the victim BB while *she was doing house chores and used 1 meter long thumb-thick stick as a thing suitable to inflict serious injuries or impair health, to hit her on the head 4-5 times, on the occasion of which she got light bodily injuries such as contusions with surface abrasions. The victim BB came into the UC where on June 15, 2006, slight bodily injures were ascertained and on that day the incident was reported to the police. Crime scene investigation was not done. On December 27, 2006, the OJT submitted a motion to indict AA, and on January 26, 2007, the first-instance judgment was reached by the OS (K.No.. 1074/06), in which AA was found guilty for the crime he was accused of. He was imposed a 7-month suspended prison sentence, and the penalty would not be implemented if the defendant in the period of 2 (two) years upon the final judgment does not commit a new crime. In the explanation of the judgment the court stated: "When deciding on sentencing the court took into account both the purpose of punishment pursuant to Article 42 of the Criminal Code, and all circumstances that could have bearing on severity of the punishment contained in Article 54 of the same Code. Thus the court found certain extenuating circumstances on the part of the defendant in the facts that he is a family man, the father of two children. The court also evaluated as extenuating circumstance his sincere remorse which was unquestionably expressed during the main hearing, as well as his public promise that something like this would never be repeated... When determining the severity of the punishment and the period of checking the court assessed the degree of wrongfullness of the crime committed and the degree of culpability of the defendant, so according to the court's appraisal the determined sanction is adequate to the severity of crime commited by the defendant." Neither the Public Prosecutor's Office nor the defendant filed an appeal on the judgment.*

It is interesting also that prior to reaching first-instance judgment, and after indictment, regardless of remorse and promises of AA stated in the explanation of the previous judgment, son CC filed criminal complaint on transcript against his father AA on January 03, 2007, on the basis of grounded suspicion that he commited the criminal offence of family violence. Namely, AA in a clear state of alcoholic intoxication, physically assaulted his wife BB, and when the son tried to protect her the offender took a piece of wood (split log) and used it to hit the son CC on the head inflicting him visible injuries. In the UC, the physician on call stated that the victim had light bodily injuries. On January 10, 2007, the police forwarded criminal complaint KU-21/07 to the Public Prosecutor's Office, which deferred criminal prosecution based on this criminal complaint, and after that dismissed it applying the principle of opportunity (Kt. No.. 70/07 dated July 26, 2007).

On May 29, 2007, the son CC reported by the telephone his father AA that he threatened to physically get even with him. The police acted upon the report, interviewed both persons, where AA negated threats because there were no witnesses to the incident or other evidence that there were threats of physical encounter, the police used their powers and based on the Law on Police gave AA a caution (Pu – 4388/07).

On April 25, 2009, the daughter-in-law DD filed a new criminal complaint against her fahter-in-law AA for family violence committed on April 24, 2009. On April 29, 2009, criminal complaint with collected evidence was forwarded to the OJT Valjevo (КУ-269/09). This criminal complaint included the information (Pu-2954/09 of April 24, 2009) that BB personally filed against AA to the on-call office of Police Department Valjevo (around 15:05 hours). She reported that the mentioned person maltreated all family members. On this occasion BB refused to file criminal complaint on transcript against her husband AA. Also, *criminal complaint (KU-269/09) included the information of the same day (April 24, 2009) which BB communicated by telephone. Namely, when she returned home from the on-call service of Police Department Valjevo, around 19:05, and while she was chopping wood she heard AA insulting DD and he threatened to kill everyone in the house. The police arrived at the scene and collected necessary information from all family members, while DD was invited to file criminal complaint in writing to the on-call police service, which she did on April 25, 2009. On July 08, 2009, after conducted investigation upon this complaint, the OJT filed a motion to indict Kt.No.407/09 AA on grounded suspicion that he committed the criminal offence of family violence. In the meantime the victim DD died of natural causes in November 2009. The OS reached first instance judgment K.No..2458/10 on October 07, 2010, and convicted the defendant AA for the crime pursuant to Article 194, paragraph 2, in relation to paragraph 1 of the Criminal Code, and imposed 1-(one)-year suspended sentence, and the punishment would not been implemented if the defendant in the period of 2(two) years following the final judgment does not commit another crime. Also, the court also imposed the security measure of mandatory alcoholic treatment at freedom, which cannot last longer than 2 (two) years.*

As for the extenuating circumstances on the part of the defendant the court assessed the fact that the legal heir of the late injured party DD, witness CC, did not join criminal prosecution, and did not set property-law request, as well as the fact that the defendant was the father of two children, while as the aggravating circumstance the court assessed the fact that the defendant had already been sentenced twice before, one for the same criminal offence.

Appeals to the first-instance judgement were lodged by both the defendant and the JT and the AS rejected both as ungrounded confirming the first-instance decision by the judgment Kž1 1998/11 dated April 29, 2011.

On March 29, 2011, the person CC on his own initiative approached the OJT and filed criminal complaint on transcript (Kt. No. 511/11) against AA because of new family violence. Namely, he said in the complaint that on March 26, 2011, around 19:00 hours, while he was in the chimney room of the house he saw through the window his fahter AA entering common yard clearly drunk and shouting words "bitch, thief, whore", to his mother BB, who was in the kitchen at the time, and after that the threatening words "I am going to kill you, I will strangle you with my bear hands here in front of the fountain". When he heard that, and knowing the violent character of his father AA, CC ran out to the terrace and shouted to his mother to lock herself in the summer kitchen and not to go out. AA then turned to his son CC saying "I will kill you from behind, I will kill you bastard, thief". He continued threatening verbally saying "if I don't manage to kill you from behind I shall sell a hectare of land and pay some people to kill both you and BB". For fear he then felt for his own life and the life of his mother, CC ran into the house and locked himself in. AA continued insulting and threatening for the next couple of hours. Criminal complaint was submitted to the police the very same day, who collected information and other evidence and made a report as an addition to criminal complaint forwarded to the OJT on April 05, 2011 (Pu-2480/11).

On April 29, 2011, the OJT summoned the victims BB and CC to give statements regarding the motion according to Article 236 of the Criminal Procedure Law to defer the criminal prosecution against AA, that he pays 15,000 dinars for humanitarian purposes, so that the criminal complaint will be dismissed due to application of the principle opportunity. Both *victims BB and CC refused the OJT's proposal. On May 19, 2011, the proposal was made to undertake investigation, which was done by the investigating judge, where the case was returned to the OJT on June 17, 2011. On July 07, 2011, the OJT filed motion to indict AA for commiting crime according to Article 194, paragraph 1 of the Criminal Code. The first-instance judgment was brought on April 05, 2012, and the defendant AA was convicted for the stated crime (K.No.798/11). He was imposed a 5-(five)-month suspended sentence, which will not be executed unless the defendant within 1 (one) year from the final judgment does not comit another crime. In the explanation of the decision the court stated as aggravating circumstance previous conviction of the defendant, and on the other hand did not find any extenuating circumstance. It was the Court's attitude that such crimial sancation was adequate to the committed crime and the degree of culpability of the defendant, and in this respect when deciding on criminal sanction the court among other things was guided by the fact that there was possiblity for some kind of improval of mutual relations between the defendant and the victims, whereas the victim AA was the party who was to contribute crucially to that imrpovement by his behaviour.* ***The opinion of the court was that in that way the goals would be accomplished of both special and general prevention.***

The appeal to this judgment was lodged by both the defendant and the OJT. The AS rejected the appeals as ungrounded and confirmed the first-instance ruling by the judgement Kž1-3021/12 dated June 20, 2012. In the explanation of the judgment among other things the following is stated: "The AS finds that the appeals are ungrounded. This is because the criminal sanction determined for the defendant by the attacked judgment for committing subject criminal offence according to the assessment of this court is in all according to the severity of the committed criminal offence and the degree of culpability of the defendant as the offender, as well as according to all other relevant circumstances pursuant to Article 54 of the Criminal Code, which the court of first instance properly determined and stated in the explanation of the attacked judgment, by the same and contrary to the presented points of appeal, gave adequate significance. This is why such imposed criminal sanction, according to the AS fully achieves the purpose of punishment prescribed by the provisions of Article 42 of the Criminal Code, as well as the purpose of imposing suspended sentence, so we find unfounded both the proposal from the Prosecutor's appeal for stricter punishment and imposing of imprisonment (since the Prosecutor stated as aggravating circumstances the elements of criminal offence which according to the assessment of this court cannot be assessed as aggravating), and the defendant's appeal that the imposed criminal sanction is rather rigorous, and due to the previously stated reasons, and in these appeals there is none circumstance stated that the court of first instance has not already assessed when imposing the criminal sanction to the defendant, and which could be significant for it."

This case study picturesquely shows the actions taken by the state organs on the reported family violence. The police reacts immediately and intervenes upon reported family violence, they process and complete the case within a few days and forward criminal complaint to the Public Prosecutor's Office. Public Prosecutor's Office tries to apply the principle of opportunity, inviting the victims to give their statements in this regards, which leads to secondary victimization of the victim. Unless criminal charge is dismissed for these reasons, criminal procedures last for a relatively long time, particularly when deciding upon the appeals of the parties. Punishing policy is mild, suspended sentence is the most frequent criminal sanction imposed, and the appeals to such rulings do not achieve appropriate results.

CONCLUDING CONSIDERATIONS

The question is where do suddenly all those "laws, initiatives, recommendations, strategies" for suppression of family violence come from. Long ago it was said that "too many laws spoil the state" or as the saying goes "too many cooks spoil the broth". Has the reason been for introducing this incrimination to leave impression in the public that the state fights against family violence, a populist-political action sending the message to prohibit punishing children or has the goal really been to increase protection from family violence? The fact is that very small number of criminal procedures ends with a sentence and imprisonment which is within the limits between special legal minimum and maximum. This means that the court in the majority cases, even when convinced that the defendant is guilty of the criminal offence of family violence, considers that suspended sentence will accomplish the purpose of punishment. We must take into account that Criminal Code prescribes that the court shall determine a punishment for a criminal offender within the limits set forth by law for such criminal offence, with regard to the purpose of punishment and taking into account all circumstance that could have bearing on severity of the punishment (extenuating and aggravating circumstances), and particularly the following: degree of culpability, the motives for committing the offence, the degree of endangering or damaging protected goods, the circumstances under which the offence was committed, the past life of the offender, his personal situation, his behaviour after the commission of the criminal offence and particularly his attitude towards the victim of the criminal offence, and other circumstances related to the personality of the offender.[s] Within the general purpose of criminal sanctions (Article 4, paragraph 2), the purpose of a suspended sentence and judicial admonition is not to impose a sentence for lesser criminal offences to the offender who is guilty when it may be expected that an admonition with the threat of punishment (suspended sentence) or a caution alone (judicial admonition) will have sufficient effect on the offender to deter him from further commission of criminal offences.[t]*In determining whether to pronounce a suspended sentence the court shall, having regard to the purpose of suspended sentence, particularly take into consideration the personality of the offender, his previous conduct, his conduct after committing the criminal offence, degree of culpability and other circumstances relevant to the commission of crime.*[u]

If we take a look at the number of pronounced suspended sentences and take into account previously stated provisions of the Criminal Code, we come to the conclusion that the offenders of family violence are correct personalities with spotless previous conduct (prior to conviction), good behaviour after the committing the criminal offence, low level of culpability in doing crime of family violence, and similar. Is it really

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[s] КЗ, члан 54. став 1

[t] КЗ, члан 64.

[u] КЗ, члан 66.

sothe statistical data on the number of repeat offenders, as well as the case study show differently.

We are of the opinion that the court of first instance should particularly pay attention of the purpose of suspended sentence and punishment in general, that courts of second instance should seriously consider in their decisions reached regarding the appeals of the Public Prosecutor's Office on the first-instance ruling the possibility to pronounce stricter punishment. One of the ways is for the second-instance judgments to order the courts of first instance to explain especially and particularly the extenuating circumstances as grounds for the court to alleviate penalty.[v]

In the end it should point out that the specific element of crime itself creates confusion both in theory and practice. Public Prosecutor's Office often makes no difference between criminal offence of family violence and misdemeanour from the field of the Law on Public Order and Peace, and various court councils of the same court reach contradictory judgments regarding the same legal issue, often interpreting differently the act and consequence of the commitment of the basic form of crime of family violence.

The advocates of this incrimination point out that it was necessary to introduce family violence into our criminal-law system so that all socially-negative phenomena characterizing violence among the family members (mostly behind the closed doors, far from the public eye), and mainly of the strong ones against the weak ones (men against women, the adults against children, the young against the elderly), will be punished more strictly. However, the results of the study suggest that our legal system, with strict scientific reasoning and objective approach, has not responded to the subject of doctrinaire analysis, and that is the problem of family violence. Amending the existing and adopting new regulations, the state is attempting to find the corresponding "recipe" to suppress these extremely harmful social phenomena, however, as we have seen based on the results of the study of our court practice, this does not give corresponding results in the field of preventing and suppressing family violence.

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[v] Decision of the Appelate Court in Belgrade, Kž 3792/2012 dated September 24, 2012. The explanation says: "Namely, from the operative part of the attacked judgment it results that the court of first instance, applying the provisions of Articles 45, 54, 56 and 57 of the Criminal Code, sentenced the defendant to six-monthimprisonment for the criminal offence of family violence pursuant to Article 194, paragraph 3, and in connection with paragraph 1 of the Criminal Code, for which the prescribed punishment is imprisonment from two to eight years, while it failed to state in the explanation of the judgment what the governing reasons were to mitigate the defendant's sentence. When deciding on the type and length of punishment the court of first instance stated in the explanation only the extenuating circumstances, not finding the aggravating ones, whereas it did not state which of the extenuating circumstances have the character of particularly extenuating ones (and if they do) due to which it mitigated the defendant's punishment. Therefore, the court of first instance has only determined extenuating circumstances on the part of the defendant, listed them, but failed to state their significance in other words did not state the reasons it was governed by when it pronounced the punishment of imprisonment below the legally set miniumum, i.e. punishment more lenient than the one legally prescribed."

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THE ROLE OF EXECUTIVE FUNCTIONS IN THE STRUCTURE OF FREE-TIME ACTIVITIES OF PEOPLE WITH AUTISM

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SUMMARY

The quality of participation in different life activities reflects a person's willingness to comply with their personal goals or social expectations to do an activity. Individual resources, including the development level of executive functions differ with regard to the degree of self-dependence and influence the level of involvement of people in their immediate life situations. When the access to leisure activities is limited, loneliness, depression, anxiety, and even suicidal behavior can occur.

The aim of this study was to determine the role of executive functions in relation to participation of people with autistic disorder in leisure activities. The research sample consisted of 32 adults with autism. None of the subjects had participated in early intervention programs prior to taking part in this research. The BRIEF-A questionnaire was used for testing behavioral aspects of executive functions along with a questionnaire for assessing recreational activities, relaxation activities and social activities. The questionnaires were administered to parents and teachers.

Results showed significant differences in the frequency of relaxation, recreational and social activities in people with autism, and the highest involvement of subjects in social activities. Executive functions were found to be significant predictors of participation in relaxation and social activities.

The participation of people with disability in leisure time activities enables their successful integration into the social community, a better perception of quality of life, better social integration and contributes to the acquisition of adaptive skills. In consideration of the finding that executive functions predict the frequency of leisure time activities, designing and implementing early intervention programs for children with disorders of the autistic spectrum that focus on stimulating thedevelopment of executive functions emerges as crucial.

Key words: Autistic spectrum, Leisure activities, Executive functions

INTRODUCTION

The quality of participation in different life activities of an individual reflects the willingness to comply with their personal goals or social expectations to do an activity. Individual resources, including the level of development of executive functions, differ with regard to the degree of self-dependence and influence the level of involvement of people in their immediate life situations (Wing, Gould & Gillberg, 2011).

Autism can be defined as a neurodevelopmental disorder characterized by significant damage to reciprocal social interaction and communication patterns, as well as limited, stereotypical and repetitive behavioral patterns, interests and activities (WHO, 1992).

Symptoms of autism negatively reflect on different social and cognitive aspects of a child's development, including the development of executive functions, which can be defined as 'mental resources necessary for formulating goals, planning and successfully carrying out goal-directed plans'. They are the core of all socially productive, self-improving, constructive and creative activities (Lezak, 1982).

Functional deficits of executive functions have been recorded in people with injuries to the prefrontal brain regions and supporting subcortical loops. Most common manifestations of said deficits are repetitive, aimless movements or speech, response inhibition difficulties, inadequate repetition of previously demonstrated actions or thoughts, decreased capacity for planning and information processing, such as the tendency to focus on one aspect of information, inability to integrate isolated details and utilize previously obtained knowledge adequately (Bojanin, Pijašo & Glumbić, 2011).

Certain behavioral pattern similarities are evident in children with autism, such as acquired executive functions deficits, caused by injuries of prefrontal brain regions. Autistic behavior can be described as rigidand is characterized by inability to accept change, focusing on details rather than the main idea, stereotypical and impulsive behavior, absence of mental flexibility and difficulties in applying acquired knowledge sensibly. There are certain similarities between executive functions deficits and autism on a behavioral level, and empirical data obtained from neuropsychological studies suggests a strong foundation for the consideration of their relation (Bojanin, Pijašo & Glumbić, 2011).

Rudimental executive functions in people with autism can have severe repercussions on decreasing participation in various areas of life, including leisure time, which can be defined as preferential time and individual activities unrelated to work or obligations. The possibility of performing individual, preferential activities induces a sense of satisfaction, friendship, happiness, spontaneity, fantasy or imagination, fulfillment, creativity, self-expression and introspection (Bujas–Petković et al., 2010). Leisure time primarily includes recreational, social and relaxation activities.

Recreational activities are a significant part of a healthy lifestyle for children with and without disability (Huetting & O'Connor, 1999), and can benefit individuals with autism in numerous ways. Taking part in recreational activities, suited to the individual needs and capabilities of the child, can lead to a decrease in aggressive behavior (Zenter, 1981), stereotypical activities (Bachman & Fuqua, 1983), depression (Folkins & Sime, 1981; Mauer & Damasio, 1988; Pappas, Golin & Meyer, 1990), sleep disorders (Mauer & Damasio, 1988), anxiety (Hollandsworth, 1972; Mauer & Damasio, 1988), stress (Kostrubala, 1976), frustration (Dodson & Mullens, 1969), tendency to cut off communication (Allen, 1980), tension (Heinzelman & Bagley, 1979) and self-harm (Baumeister & MacLean, 1983).

Social activities, such as visiting friends, going to church, on trips, to coffee shops, restaurants, theaters or concerts with friends (Howlin, Goode, Hutton & Rutter, 2004) facilitatethe integration of people with autism into society, the development of social skills (adequate reactions, movements, conversations on different topics, paying and receiving compliments, sharing ideas), and the enhancement of verbal and adaptive abilities (Barry et al., 2003).

Previous research suggests that people with autism spend most of their leisure time participating in passive, or relaxation, activities at home. The most frequent relaxation activities, as reported by certain studies,are television watching, playing computer games and listening to music (Orsmond & Kuo, 2011). This kind of leisure time structure does not provide sufficient physical activity, which can lead to obesity, due to excessive interest in food, and increased risk of developing chronic illnesses (Glumbić, 2006). Furthermore, passive lifestyle can result in decreased muscle tone, mobility and flexibility, poor circulation, respiratory and digestive problems, attention and concentration disorders and general deterioration of psychomotor activity (Duquette, Carbonneau, Roult & Crevier; Boddy et al., 2014; Ahn & Fedewa, 2011).

Understanding the structure of leisure time, and the role and importance of executive functions development in regard to leisure time structure can prove to be useful in furthering the effectiveness of these activities by focusing, modifying and adapting them to fit individual needs of people with autism, as well as in emphasizing the need for stimulating the development of executive functions.

The aim of this research was to examine the structure of leisure activities and the role of executive functions in relation to the level of participation in these activities observed in individuals with autism.

MATERIAL AND METHODS

The present research was conducted during 2015 on the territory of Novi Sad, Republic of Serbia in several institutions: autism daycares center, primary and secondary school, with student dormitory, 'Milan Petrović', organization for providing support to people with autism of the city of Novi Sad, home for children with developmental disabilities 'Veternik' in Veternik, and primary and secondary education facility 'Jelena Varjaški' in Vršac. Prior to the research, all facilities provided written approval forparticipation. Questionnaires were administered to parents and teachers, who participated voluntarily and anonymously. Written parental approval for participation was provided, and the study was conducted with respect to all ethical principles of scientific research.

The following instruments were used:

1. Standardized *BRIEF-A questionnaire* designed to assess different aspects of the behavioral status of executive functions (Gioia, Isquith, Guy & Kenworthy, 2000). It consists of 75 items, with a three-level Likert scale (never, sometimes, often), and is used for testingadults, aged 18 to 90. Two forms of the questionnaire were developed: one for self-assessment and another for objective assessment by close friends and family. This research utilized the latter form. Scores on nine subscales were analyzed: inhibit, shift, emotional control, self-monitor, initiate, working memory, plan/organize, task monitor and organization of materials. Raw sum scores for individual scales were computed into T-scores according

to normative tables of the original interpretation instructions. Higher scores on each subscale suggest higher dysfunction levels of a particular executive function.

2. Unstandardized *questionnaire for assessing recreational, social and relaxation activities* created for the needs of this research. It consists of questions grouped by activity type: Relaxation activities, Recreational activities and Social activities and assesses frequency and level of necessary support in all three groups of leisure activities (relaxation, recreational and social activities). Activity frequency is scored as: 0 – never performs activity; 1 – moderately performs activity; 2 – often performs activity; 3 – regularly performs activity.

Sum scores are calculated by adding all scores for every activity in individual scales and then comparing it to the predicted sum score for scale in question. Necessary support level is scored as: 0 – performs activity independently; 1 – requires presence of another person to perform activity; 2 – requires encouragement to perform activity; 3 – requires physical support to perform activity. Percentages of all four individual support levels are calculated for the three activity groups (relaxation, recreational and social activities). This questionnaire also assesses with whom the individual most commonly performs said activities: 1. independently; 2. with parents; 3. with friends; 4. organized by institutions (with experts). The percentage of every answer choice is calculated for different activity groups.

RESULTS

Multiple regression analysis was used for testing the predictive value of executive functions development in relation to leisure time activities.

Table 1 *Relation of executive functions and relaxation activities frequency*

Variables	B	β	t	p	R	R2	F	p
Inhibit	0.02	0.30	0.82	0.42	0.79	0.63	3.29	0.01
Shift	-0.05	-0.32	-0.91	0.37				
Emotional control	0.05	0.07	0.26	0.79				
Self-Monitor	-0.08	-0.12	-0.46	0.65				
Initiate	0.08	0.75	1.67	0.11				
Working memory	-0.04	-0.48	-1.40	0.17				
Plan/Organize	-0.06	-0.72	-2.32	0.03*				
Task-monitor	-0.00	-0.05	-0.15	0.88				
Organization	-0.01	-0.18	-0.62	0.54				

As shown in Table 1, executive functions significantly predict participation in relaxation activities ($R=0.79$, $R^2=0.63$, $F=3.29$, $p=0.01$). The observed high and positive correlation of the variables indicates that individuals with a higher level of development of executive functions more often participate in relaxation activities. The only subscale that significantly predicts participation in relaxation activities is Plan/Organize – individuals with higher scores on Plan/Organize scale seldom participate in relaxation activities.

Table 2 *Relation of executive functions and social activities frequency*

Variables	B	β	t	p	R	R2	F	p
Inhibit	0.07	0.28	0.82	0.42	0.83	0.69	4.24	0.00
Shift	-0.04	-0.09	-0.28	0.77				
Emotional control	-0.06	-0.35	-1.34	0.19				
Self-Monitor	0.07	0.19	0.73	0.47				
Initiate	0.07	0.25	0.60	0.55				
Working memory	-0.09	-0.35	-1.11	0.28				
Plan/Organize	0.02	0.10	0.35	0.73				
Task-monitor	-0.13	-0.34	-1.08	0.29				
Organization	-0.11	-0.43	-1.56	0.13				

Results shown in Table 2 suggest that executive functions significantly predict participation in social activities ($R=0.83$, $R^2=0.69$, $F=4.24$, $p=0.00$). The high and positive correlation of variables suggests that individuals with a higher level of development of executive functions more often participate in social activities; however, none of the subscales of executive functions show significant individual contributions.

Table 3 *Relation of executive functions and recreational activities frequency*

Variables	B	β	t	p	R	R2	F	p
Inhibit	-0.01	-0.12	-0.25	0.80	0.62	0.39	1.21	0.34
Shift	-0.07	-0.40	-0.89	0.38				
Emotional control	0.02	0.30	0.80	0.43				
Self-Monitor	0.02	0.13	0.36	0.72				
Initiate	0.11	0.89	1.53	0.14				
Working memory	-0.02	-0.22	-0.51	0.61				
Plan/Organize	-0.02	-0.25	-0.62	0.53				
Task-monitor	-0.05	-0.31	-0.68	0.50				
Organization	-0.06	-0.54	-1.39	0.18				

Results shown in Table 3 indicate that executive functions do not predict the level of participation in recreational activities ($R=0.62$, $R^2=0.39$, $F=1.21$, $p=0.34$).

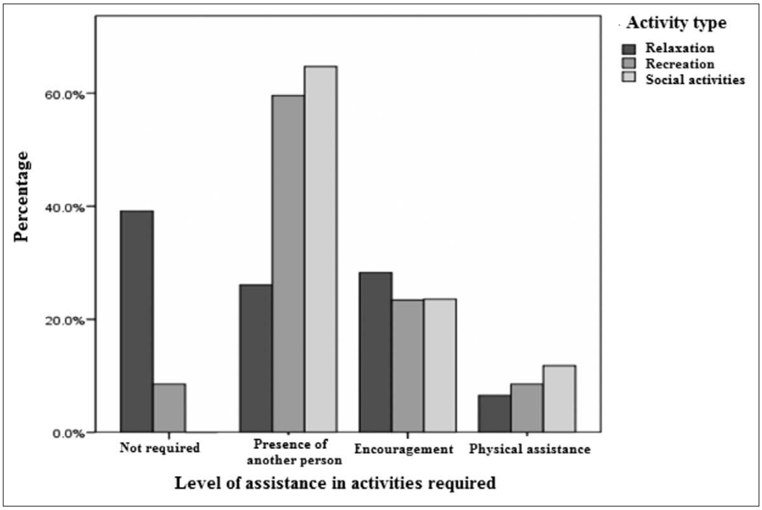
Repeated measures ANOVA analysis was used to determine differences between the three groups of leisure time activities.

Table 4 *Participation frequency differences for three groups of leisure time activities*

Activity	Mean	Sd	F	p
Relaxation	1.82	0.38	17.75	0.00
Recreation	1.45	0.46		
Social	2.18	0.91		

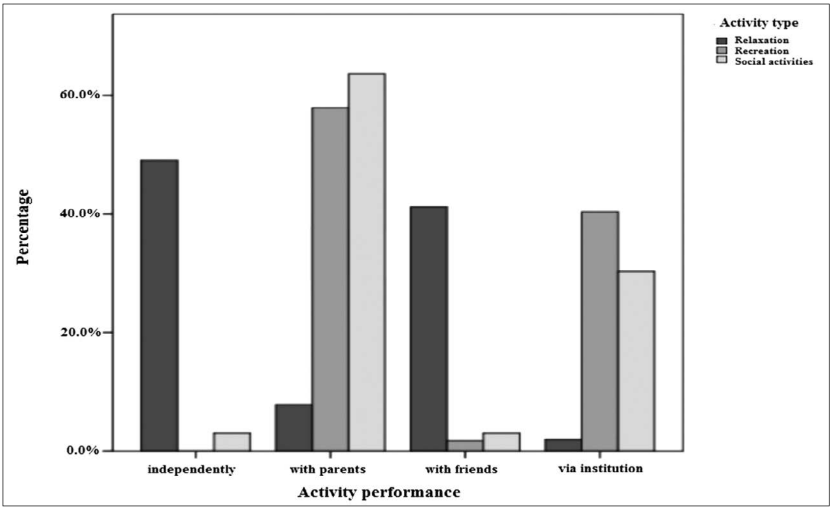
Results (Table 4) show significant differences in frequency of relaxation, recreational and social activities in individuals with autism ($F=17.75$, $p=0.00$). Post-hoc analysis shows that individuals most often participate in social activities in comparison to recreation and relaxation activities. Also, they more frequently participate in relaxation activities in comparison to recreational activities.

Graph 1 indicates that individuals perform relaxation activities independently, but require assistance in form of another person's presence or encouragement in certain activities. In order to perform recreational or social activities they mostly require the presence of another person or encouragement.



Graph 1

Graph 2 shows that recreational and social activities are most often performed with parents or through institutions (with experts), while relaxation activities are performed either independently or with friends.



Graph 2

DISCUSSION

Executive functions represent a wide range of higher cognitive processes: ability to isolate from context, inappropriate response inhibition, activity sequence planning, task continuation, performance tracking and utilizing feedback, shifting focus (Rajendran & Mitchell 2007; Happe & Frith, 1996). Executive functions can be interpreted as central or general self-regulatory capacities for managing basic and specific aspects of cognitive processes with the aim of achieving problem solving and goal-oriented behavior. Although many definitions and models are conflicted, most would agree that the general term 'executive function' is used to define a supervisory, self-regulatory or control function which organizes and directs all cognitive activities, emotional responses and manifested behavior (Isquith, Crawford, Andrews & Gioia, 2005) and consists of several neurocognitive processes, including working memory, cognitive plasticity, response choice, inhibition, initiation, forming and sustaining set,which allow for the involvement in rational, meaningful, goal-oriented and future-oriented behavior (Suchy, 2009).

When it comes to executive functions in autistic people, research has shown that individuals with autism manifest numerous deficits of most higher cognitive processes. Specific deficits in the domain of cognitive plasticity have been reported, along with preserved inhibition capacities (Robinson et al., 2009). However, children with autism experience the same difficulties in solving conflicting inhibition tasks as children and adolescents of typical development (Šimleša, 2011). Also, tests designed to assess planning capacities show that adults with autism achieve lower results in comparison to adults of typical development and the children control group (Gilotty et al., 2002). Research of working memory in autistic individuals indicates deficits of this domain, specifically of simultaneous information processing and working memory capacities (Liss, 2001). Certain studies confirm evident deficits of generating, or the ability to generate ideas, seen in autistic subjects in comparison to the control group (Robinson et al., 2009). Tasks that do not assess direct introspection, but certain aspects of introspection, such as correcting mistakes, suggest that individuals that suffer from a disorder of the autistic spectrum find the solving of these tasks to be challenging (Robinson et al., 2009).

Damaged executive functions, as such, can affect a person's ability to function in all areas of life, including leisurely activities, which, as mentioned, include recreational, social and relaxation activities.

The results of the present study indicate that executive functions can be considered as important predictors of participation in relaxation and social activities in autistic individuals. Subjects that manifested a higher level of development of executive functions, more often participated in relaxation and social activities. Contrary to expectation, not many predictors showed significant contributions to the explanation of the dependent variable. The significance of the two regression models, without many individual significant predictors, can potentially be explained by the assumption that different behavioral aspects of executive functions do not operate independently, which questions the possibility of assessing their particular influences on engaging in relaxation and social activities. Furthermore, it can be assumed that different aspects of executive functions tend to intercorrelate highly, which could suggest that they operate as a universal factor.

A study conducted by Gillorty et al. (2002) found that communication and social skills in 35 people with autism correlate with metacognitive capacities, specifically initiation and working memory, which indicates the importance of executive functions deficits in people with autism. The comparison of daily skills, including performing leisure time activities, in high-functioning and low-functioning autistic people showed that decreased intellectual abilities of low-functioning autistics hinderthe obtaining of new day-to-day life skills. In case of high-functioning autistics, specific deficits in domains of language and verbal memory impede the development and acquisition of everyday life skills (Liss, 2001).

Results of the present study also show a significant difference in the frequency of relaxation, recreation and social activities in autistic people. Subjects most commonly participate in social activities, as compared to both recreational and relaxation activities.

Social activities such as visiting friends, going to church, going on tips, to coffee shops, restaurants, concert, theatres etc. (Law, 2002) are greatly beneficial as they enable social integration of people with autism. Results show a higher frequency of social activities, which can be explained by the fact that social functioning of people with autism is most affected by the disorder, making it the primary focus of both research and intervention. People with autism are usually not interested in their peer's activities, making friends, or going to coffee shops and restaurants. They are more interested in the physical, rather than the social reality, and interacting with adults rather than peers (Baron-Cohen, 1995).

Another study, Glumbić, (2006) conducted on a sample of 24 people with autism, showed that of the entire sample, only two subjects were able to go to the church or a concert. Parents avoid activities similar to these out of fear of potential temper tantrums of their child. According to Glumbić (2005) Shaked (2005) reports that Israeli mothers avoided taking children to church because they feared 'the members of the community would be shocked by their inappropriate behavior'. Artistic, entertaining, cultural and other activities are also a rare commodity for people with autism. Glumbić (2006) indicates that his study showed only one person with such experience.

The next result of this study shows that subjects significantly more often participate in relaxation activities compared to recreational activities. Such findings are consistent with previous research. People with autism less commonly participate in non-structured and physical recreational activities (Glumbić, 2006). In a study conducted on 24 children with autistic disorder, Glumbić (2006) reports that more than half the children do not participate in recreational activities (62.5%) or sports (54.17%). Bandini et al. (2012) compared the levels of physical activity of autistic children and their peers. Results of their study show that children without autism participated in various physical activities and spent more time engaged in these activities than children with autism. Rosser Sandt and Fray (2005) report that autistic children are insufficiently involved in physical education classes, and that they require special support to help them understand what is expected of them and how a certain activity is performed. Study results of Orsmond et al. (2004) indicate that walking and exercising are the most common physical activity forms in autistic adults. As these activities do not require intensive social contact, people with autism willingly accept them.

As mentioned before, this research found that relaxation activities are more frequently performed than recreational activities, which is consisted with earlier findings.

People with autism spend most of their leisure time engaged in passive, or relaxation, activities at home. Most commonly reported activities are watching television, playing computer games and listening to music (40).

In a study conducted on 20 children with autistic disorder, Brewster and Coleyshaw (2011) researched leisure time activities that would be compelling to young people with autism, and their specificities. Results show that most of the young people included in the sample spend their leisure time at home. Younger children generated more ideas about the types of activities they would be interested in taking part in, while the older children did not show interest. The latter finding is a possible consequence of the frustration due to obstacles they face on a day-to-day basis. Most subjects manifested difficulties in social interactions. Younger children wanted to play, while the older children mostly preferred to be alone.

The reasons behind difficulties in leisure activities participation are that leisure time tasks demand functionality and capacity for choice making. For the activities to be free, or leisurely, they require the person to perform them independently and freely and be functional in these activities (Bambara, Koger & Bartholomew, 2011). This is not the case when it comes to autistic people, for they more often require parental, caretaker or teacher support and assistance. These conclusions are consistent with the findings of the present study which show that relaxation activities can mostly be performed without assistance, with required support in form of adult presence or encouragement in certain activities. Recreational and social activities mainly require adult presence or encouragement (Seward, 2014).

Previous research confirms that people with autism mostly prefer to take part in leisure activities organized and carried out in daycare centers (Beart, 2001) that have been planned in advance by professionals and family members. Organized as such, leisure activities do not reflect individual interest of people with disability (Zijlstra & Vlaskamp, 2005), a finding confirmed by the present paper, showing that recreational and social activities are mostly performed with parents or in institutions, while only relaxation activities are performed either independently or with friends.

CONCLUSION

The participation of people with disability in leisure time activity enables more successful integration into the social community, better perception of the quality of life, better social integration and contributes to the acquisitionof adaptive skills. In consideration of the finding that executive functions predict the frequency of leisure time activities, it is imperative to emphasize the significance of focusing early intervention programs on stimulating the development of executive functions.

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CREATING A NEW PERSPECTIVE OF SCHOOL: EXPERIENCES THROUGH SELF-EVALUATION APPROACH

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SUMMARY

In recent years, the process of self-evaluation has begun to change the consciousness of the need to strengthen the autonomy of schools emphasizing the importance of the quality of teaching and interpersonal relationships. Numerous studies of the effectiveness of schools highlight the teachers as the most powerful entity that affects the progress of students (eg. Hamre & Pianta, 2001; Clement, 2009; Bezinović, 2010; Kudek Mirošević, 2012, 2015). The personality of the teacher and his competence in the field he teaches, as well as the teaching strategies he uses, have a significant role for the development of students. Students best learn and make progress in an environment where they can feel the teachers' concern and effort for them to achieve the biggest possible progress. Therefore, this study aims to examine differences of opinion between the seventh and the eighth graders on the educational strategies of their teachers and also on the peer support as provided by them. The study was conducted on a sample of 114 seventh and eighth graders from a primary school in the city of Zagreb. The differences between the seventh and the eighth graders were tested through the nonparametric Mann-Whitney test and the Kruskal-Wallis test. The results confirm the initial hypothesis according to which there is no difference between students in the assessment of educational work and educational support provided by the teachers or the students between themselves.

Key words: students, teachers, educational support, teaching strategies, self-evaluation of school

INTRODUCTION

Self-evaluation of school is a method that reflects the practice of all the members of the educational process, as well as other employees in school, and identifies the areas where certain activities should be encouraged to make progress in improving the students' learning, in instructing teachers and upgrading their professional education (Chapman & Sammons, 2013). Research, most frequently, report responsibility and professional development of teachers to be the purpose of self-evaluation of school and assessment of the teaching staff (Danielson & McGreal, 2000; Peterson, 2000; Stronge, 2006). Thus, through the process of self-evaluation, school can be a fundamental force in achieving improvements of the teaching procedures. The process can be directed to certain aspects of the school activities, as well as to certain subjects that determine the educational process. Through school self-evaluation procedure one can collect a number of data on the effectiveness of the educational process in order to get an insight on the academic achievements and on the adopted students' life skills and habits (Chapman & Sammons, 2013). Since each school has its specific needs with regard to meeting and realization of certain goals, its mission and purpose will be made clear by the self-evaluation procedure.

As the most significant resource in schools, teachers are the key ones for rising of educational standards. Improving the efficiency and equity of schooling depends, in large part, on the extent to which teachers are a highly skilled, agreeable resource that is motivated and competent for planning and executing the objectives of the curriculum. The course of a prestigious educational policy is to raise the efficiency of the teaching procedure which will most likely lead to a significant shift in the students' learning (OECD, 2005). On the other hand, effective monitoring and evaluation of teaching is the key to continuously improve the efficiency of teaching procedures in school. The role and responsibility of the teacher can be recognized only from the explicit statements given by the students or their parents on the teachers' professionalism and personal responsibility, on the basis of which the image of a school is generally produced. Typical fields of responsibility may include: educational planning and work strategies, assessment, evaluation and assessment of students, class management and other professional competences of teachers. It is important to be aware of the advantageous sides of teachers and, also, of those aspects in their teaching practice that could be further developed. Within this perspective, the method of evaluation of teachers is an important step to enhance the efficiency of teaching and learning and also to raise the educational standards.

Stronge & Tucker (2003) draw attention to the importance of assessing teachers for their teaching methods and point out that without fully competent teachers in the classroom not one educational reform can be successful. The core of education is teaching and learning, while the teaching-learning interrelation functions best with efficacious teachers that work with each student every day. This creates a dynamic relationship between teachers and students, which is the basis of every prestigious school. This type of synergistic relationship about equally contributes to the improvement of performance and also to the quality of teachers and schools, as well as to achieving the desired objectives (Stronge, 2006). The same author mentions some of the manifestations that can occur as the result of improvement, such as; the improvement in the teachers' performance of the teaching procedure and also the improvement in providing educational support by other professional stuff, the improvement in the planning of programs and services for the students, their parents and for the community, and the improvement of the school competences to accomplish the planned goals. The system of evaluating the teachers should also reflect in effective communication they exercise, such as in public relations or in everyday interpersonal relations (Stronge, 1995). Stronge (2006) discloses the importance of communication between the teachers, the students and between all the actors in the educational process, which must act as a team, stating accordingly that good communication allows further cooperative development in the teaching process. Such evaluation in the process of self-assessment provides teachers with the opportunity for systematic improvement of their individual skills and better performance of their teaching methods in the classroom, for improvement of their own expectations, it increases the likelihood of change and betterment of the teaching procedures, and it also identifies the ways to reach higher standards and how to correct significant deviations from the expected ones.

In analyzing the relations and the ways of communication between the teachers and the students, the method of self-evaluation in a school can upgrade and advance the development of their competence thus to prevent the occurrence of problems (Cowen, 2000). Prevention of behavioural problems therefore presupposes a clear definition, classification, continuous recording and monitoring (Bouillet & Uzelac, 2007). Starting points of every school which wants to have a prestigious educational process are not universal standards, but those which imply that each and every student can progress and be successful in accordance with their abilities and capacities, while the role of the school is to provide its optimal support and enable them to succeed. Therefore, the quality of teaching is the top priority of a school, while the involvement of students, the quality of learning and the entire educational process depend on it (Bezinović, 2010).

A number of studies emphasize that the agreeable and supporting relationships between teachers and students are fundamental for a healthy physical and mental development of all students (Birch & Ladd, 1997, 1998; Pianta, 1999; Hamre & Pianta, 2001). Birch & Ladd (1997), for example, mention Lynch & Cicchetti (1992) who describe different patterns in the relationship between teachers and students in view of the differences in the psychological and emotional perception of the mutual relationships. Namely, the relationship between teachers and students can influence further development of students, with regard to the fact that the adopted patterns of communication with each other and the support they have at school can affect the development of the model of behaviour of students in their efforts to adapt to the school environment (Birch & Ladd, 1997). Positive relationships between students and teachers serve as a valuable resource for students faced with the risk of the failure in school, while the conflict or the lack of agreeable communication between students and teachers might give rise to the possibility of risks and difficulties (Ladd & Burgess, 2001). The need for positive relationships between students and teachers does not reduce with the students' coming of age. Indeed, the importance of support to students to be given by their teachers and peers is particularly important when they move from primary to secondary school (Wentzel, 1998). Pursuant to the research results that Livazović & Vranješ (2012) obtained in their investigation, the authors identify the need for preventive and educational-formative (corrective) measures to be practised with younger primary school students, thus to prevent possible physical and verbal violence in the older ones. Accordingly, the same authors give the fundamental recommendations to the teachers that involve consistent and mutually coordinated actions through continuous preventive activities, open and honest (assertive) communication and counselling, along with spending time with students to a greater extent, such as through participating in joint school activities. In this way, teachers become a respectable and important social role model for students that will motivate them to use the acquired knowledge, skills and habits in their future education with responsibility. Consequently, the students will soundly advance – mentally, socially and emotionally – and, as suggested in the National Curriculum Framework in Croatia (2010), the students will be competent enough to describe and discuss their feelings, ask questions about their health and progress, they will know and will be able to describe themselves compared to others (class, peers, teachers, family), explore and share the ideas about relationships with others and show respect for others by sharing activities and responsibilities in the classroom and in the peer group, and also be competent enough to identify someone's similarities and differences thus to be able to respect the diversity and uniqueness of each and every individual.

THE METHODOLOGY OF SCIENTIFIC RESEARCH

Research problem and aim

Since the future of a community depends on the quality of the national education as a whole, the whole society has high expectations. School is therefore expected to encourage the personal development of each and every student in the most competent way, by improving his emotional, social and academic competences thus to contribute to the development of human, social and intellectual potential of the society. The analysis and self-evaluation of existing procedures and practices in schools try to improve and change the educational methods. Such an approach, within the framework of self-evaluation of schools, sets the foundations for a reasoned discussion and evaluation of the classroom environment, for determining the developmental priorities of school and work in the classroom as planned by the individualized approach and based on co-operative models. In Croatia, according to the Law on Education in Primary and Secondary Schools (Official Gazette, 87/08, 86/09, 92/10, 105/10, 90/11, 5/12, 16/12, 86/12, 126/12, 94/13 and 152/14) and the Ordinance on Primary and Secondary Education of Students with Disabilities (Official Gazette, 24/15), education of students is based on the principles of acceptance of diversities in all students. This primarily relates to the acceptance of different characteristics of their development and ensuring of the conditions and support for each student to obtain the maximum development potential. In this way, by providing adequate forms of educational support, the educational advance of the students will be made possible, respecting specific quality of their functioning and their educational needs, thus creating cooperating behaviour based on respect, acceptance and mutual assistance.

In the context of self-evaluation of school while providing educational support, formative evaluation aims to explore the efficiency of different teaching methods in order to create a starting point for more successful forms of help and support to individuals and groups in this attempt (Sekulić Majurec, 2013), and also interventions aimed at strengthening personal and social competences of students. In order to develop an integrated personality of each individual and improve the quality of the environment in which students live and learn, the importance of a coordinated social, emotional and academic learning is emphasized. In accordance with the described points, the aim of this research was to examine the differences of opinions between the seventh and the eighth graders on the educational strategies of teachers and on the support as provided by their peers.

The research is based on the null hypothesis (H_0) according to which there is no statistically significant difference between students in the assessment of educational work and of educational support as provided by their teachers or the students between themselves.

METHODS

Participants

The study included 114 participants (seventh and eighth graders) as a pattern. The survey was carried out among 61 seventh-grade students (53.5%) and 53 (46.5%) eighth-grade students from an elementary school in Zagreb. The name of the school is not listed here in order to protect their identity; however, their identity is known to the author of this work. The study comprised 47% of boys and 53% of girls. Of those surveyed, 13% of them are the students with disabilities and 87% of them are without disabilities. In accordance with this, one can say that this is an average regular primary school that meets the support to the inclusion of students with disabilities in accordance with the elements of educational inclusion. Of the total number of students covered by this investigation, 48% of students had an excellent overall score at the end of the previous school year, 46% were very good and 6% were good. The above sample of participants was selected on the assumption that the students might have diverse ways of thinking at the final phase of their primary education. Namely, taking into account the fact that the students in the final grades of primary school were included in the biggest number of school prevention educational programs, as well as in a large number of workshops and other collaborative tasks, it was to be assumed that, with the aim to build up their self-confidence, responsibility and ability to make their own decisions, the joint action with other factors that took part in education process during their primary schooling helped strengthen their own personality, their ability to identify adequate teaching styles, develop life skills and communication skills especially and, also, their emotional intelligence.

Instrument

For the study of the opinions of students on educational strategies of teachers and on the peer support as provided by them, a questionnaire for students was designed. The questionnaire consisted of 57 statements, while the five-step scale aimed to assess how students, in the final grades of their primary education, evaluate their behaviour, the degree of satisfaction with school and the ways of working in school. The scale is the five-step ordinal one, on which the examinees chose the degrees of evaluation among the following given values: 1-never, 2-rarely, 3-sometimes, 4-frequently, 5-always. The results of the assessments of the respondents as presented in this study relate to the part of the questionnaire which includes ten statements which tested students' views on the educational support as provided by the teachers, strategies of their work and on the extent of the peer support as provided by them. Basic descriptive values of the scale are shown in Table 1.

Table 1 *Descriptive Statistics*

	N	Minimum	Maximum	Mean	Std. Deviation	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
Teachers respect me and are considerate of me. (TERESP)	113	1	5	3,14	1,253	-,217	,227	-,911	,451
Teachers teach their subject in an interesting, clear and understandable way. (TEINTE)	112	1	5	2,47	1,090	,325	,228	-,448	,453
Teachers give me feedback about my learning and accomplishments regularly and in an understandable way. (TEFEED)	113	1	5	2,73	1,282	,150	,227	-1,134	,451
Teachers adapt teaching methods to the students in need. (TEADAP)	113	1	5	3,67	1,292	-,681	,227	-,612	,451
Students help students in need to learn. (STHELP)	113	1	5	3,13	1,333	-,132	,227	-1,094	,451
Teachers point out what we have successfully done. (TEPOIN)	113	1	5	3,09	1,130	-,101	,227	-,596	,451
Teachers approach students in need during lessons and help them with the task. (TEHELP)	113	1	5	3,15	1,248	-,150	,227	-,967	,451
Teachers and students in need agree on the time when to examine them. (TEAGRE)	114	1	5	3,39	1,252	-,431	,226	-,734	,449
I feel fear of examinations or writing tests. (FTESTS)	114	1	5	3,43	1,337	-,356	,226	-1,043	,449
I am satisfied with my teachers and school. (ISATTE)	113	1	5	2,88	1,208	-,084	,227	-,746	,451

The statements from the Questionnaire, taken for the purpose of this paper, are outlined in the National Curriculum for Preschool Education, General Compulsory and Secondary School Education (Ministry of Science, Education and Sports, Republic of Croatia, 2010) which accentuates that education in primary school is based on equal educational opportunities for all the students. This aspect is embraced by the following statements in the Questionnaire: Teachers respect me and are considerate of me (TERESP), Teachers adapt teaching methods to the students in need (TEADAP), Students help students in need to learn (STHELP). By regulating general education, that is – basic competences, one ensures better ingenuity in life for each and every student, thus preparing him for the ever changing and unpredictable world in which he should be ready for lifelong learning. In doing so one achieves meaningful integration of educational contents, more flexible ways of programming and planning of educational work which is oriented primarily towards the students. In the Questionnaire, this approach is embraced by the following statements: Teachers teach their subject in an interesting, clear and understandable way (TEINTE), Teachers give me feedback about my learning and accomplishments regularly and in an understandable way (TEFEED), Teachers point out what we have successfully done (TEPOIN), Teachers approach students in need during lessons and help them with the task (TEHELP), Teachers and students in need agree on the time when to examine them (TEAGRE), I feel fear of examinations or writing tests (FTESTS), I am satisfied with my teachers and school (ISATTE).

Method of collecting and processing data

In the first task students were notified that the survey was anonymous and accordingly instructed to respond honestly to the questions therein. In accordance with the Code of Ethics pertaining to researches with children, the investigation satisfied the preconditions of anonymity, observing their age, and also the general principles of the Code of Ethics pertaining to researches with children, such as respect for human rights and dignity of persons, promotion of responsibility, objectivity, accuracy and fairness. The students' task was, after they read each statement, to put an X in only one of the five columns of the offered answers (never, rarely, sometimes, often or always) with each claim.

The results were analyzed by descriptive analysis in order to assess whether there were differences between the seventh and the eighth graders in their attitude and their assessment of the teachers' educational work, or, else, of their educational support and that of the students between themselves. From the values of descriptive statistics as shown in Table 1, it is possible to conclude that the measures of central tendency are relatively high, which implies that the students positively assessed the educational work in school, or, respectively, they assessed their teachers as having relatively good competence with regards to the implementation of strategies in their educational work, i.e. their teaching methods and resources were applied competently, as well as their skills in the organization of educational work and teaching. However, as evident from the data in Table 1, the highest arithmetic mean was found in the statement Teachers adapt teaching methods to the students in need (TEADAP), followed by the statement I feel fear of examinations or writing tests (FTESTS) and then the one Teachers and students in need agree on the time when to examine them (TEAGRE). The lowest arithmetic mean has the statement Teachers teach their subject in an interesting, clear and understandable way (TEINTE), followed by the statement Teachers give me feedback about my learning and accomplishments regularly and in an understandable way (TEFEED) and then the one I am satisfied with my teachers and school (ISATTE). Following the results of this research there is a reason to put the following question: In view of the fact that the quality of school is satisfactory, can one speak of the school being recognized as the one that organizes and implements entirely individualized educational process to the full and to what extent its internal capacities and competences meet this function? Does this mean that in the process of self-evaluation and strategic planning schools should pay more attention to the current strategies of educational support that still do not provide enough concrete opportunities and feedbacks to those students who need it? Also, as shown by these values, and if different strategies of operation taken into account, when talking about the organization of work in school – Is it necessary to develop the competence of teachers to use teaching techniques that will help improving the quality, as a means for more successful adaptation of students, in a clear and understandable way? It is this issue that numerous scientific studies point out, for example, (Meuret & Morlaix, 2003; Leung, 2005; MacBeath, 2006; McNamara & O'Hara, 2006; Jung Peng, Thomas, Yang & Li, 2006; Bezinović, 2010; Tot, 2013; Kudek Mirošević, 2015) which also give emphasis on the need to ensure prestigious education along with the promotion of teamwork, social inclusion and equal opportunities for all students. In connection with this, it is important to recognize all the factors that contribute to the learning outcomes and personal development of students.

In addition to the descriptive indicators, as part of inferential statistics applied to test the differences between the seventh and the eighth graders, the nonparametric Mann-Whitney test was used to test significances between two independent samples, while for testing the differences with regard to the overall success of students the Kruskal-Wallis test was used. The collected data were analyzed by SPSS, ver. 17:00.

RESULTS AND DISCUSSION

The differences between the students, if the grade they attend (seventh and eighth) taken into account, were tested by the Mann-Whitney nonparametric test. The results reported in Table 2 show that p>0.05, which means that the difference between the students who attend the seventh grade and those who attend the eighth grade is not statistically significant at the level of 0.05, in other words, there is no difference between the students with regard to the grade they attend. Namely, the students who were about to finish their primary education, went through a number of prevention programmes for the development of social skills and habits and were included in numerous methods and forms of work, like teaching workshops, debates, discussions, role-play and other methods, as were used, that built up their personal and social development. Therefore, the respondents' answers reveal the fact that the purpose has been fulfilled – that of training the students on personal and social development in order to make them competent enough to recognize and critically assess their own values and also social values as essential factors that have influence on their own opinions and ways of acting.

Table 2 *Mann-Whitney Test Statistics. Grouping Variable: Class*

	TERESP	TEINTE	TEFEED	TEADAP	STHELP	TEPOIN	TEHELP	TEAGRE	FTESTS	ISATTE
Mann-Whitney U	1425,000	1559,500	1346,000	1551,500	1474,500	1348,000	1358,000	1366,500	1491,000	1395,000
Wilcoxon W	2856,000	2937,500	2777,000	2929,500	3304,500	2726,000	2789,000	2797,500	2922,000	2826,000
Z	-,975	-,003	-1,440	-,206	-,680	-1,422	-1,369	-1,462	-,732	-1,167
Asymp. Sig. (2-tailed)	,330	,998	,150	,837	,497	,155	,171	,144	,464	,243

p>0.05

Table 3 shows that the non-parametric Mann-Whitney test revealed the significance level of $p<0.05$, which means that there is no difference between students in the seventh and the eighth grades, given the students with disabilities and students without disabilities. In conformity with the organization of teaching which should be based on the distinctive and individualized teaching approach, it is important to implement in the teaching process the necessary distinctions in the goals or, in other words, in the expected accomplishments, contents and methods of learning and teaching, all to be in accordance with the students' individual abilities and specifics. This argument might be supported by the respondents' answers as well. Namely, as shown by the data from Table 1, the students recognize that teachers adapt the methods of their work to those students who need it (for instance, they adapt the contents, reduce the amount of requirements etc.) and that they also agree with the students on the terms to fulfil their agreement. This also affects their relative content with school, which might increase (given the lower arithmetic mean, Table 1), because if one wants to include all the students in the teaching process, the teaching methods must vary and integrate. Since the goals of education are different, so the methods must be different too, all in accordance with the different individual learning styles of students (visual, auditory, kinaesthetic, directed at the symbols and active in a group) (Mattes, 2007). The results from Table 1 also support this argument and they show, as well, that the students recognize that teachers do not disclose the contents they teach in a clear, understandable and interesting way, and that the students do not get from their teachers regular feedback on their learning achievements and success. Furthermore, in support of the results in Table 3 on the absence of differences in responses between the students with disabilities and the students without disabilities, the thesis comes up that all the groups of students require individualized approach and modifications of the educational process, that is to say – educational support of various types and levels. A necessary prerequisite in planning the curriculum for individualized teaching and working with students with disabilities is continuous and prestigious professional training of teachers and cooperation between all the holders of the educational process (National Curriculum Framework, 2010).

Table 3 *Mann-Whitney Test Statistics. Grouping Variable: Disabilities*

	TERESP	TEINTE	TEFEED	TEADAP	STHELP	TEPOIN	TEHELP	TEAGRE	FTESTS	ISATTE
Mann-Whitney U	661,000	605,000	664,500	722,500	536,500	595,000	603,500	696,000	679,000	701,000
Wilcoxon W	5512,000	5555,000	5515,500	842,500	5387,500	5446,000	5454,500	816,000	799,000	5552,000
Z	-,643	-,364	-,612	-,110	-1,718	-1,229	-1,141	-,401	-,547	-,299
Asymp. Sig. (2-tailed)	,520	,716	,541	,913	,086	,219	,254	,688	,585	,765

$p>0.05$

The results shown in Table 4, obtained by the non-parametric Mann-Whitney test, show that there is no difference between respondents according to sex, which is in accordance with the significance level of 0.05 ($p > 0.05$). Namely, some studies interpret, given the development of anxiety, for instance, that one of the assumptions is that girls are generally more anxious than boys, in that there are more situations in which they react with anxiety symptoms. Some other interpretations put more emphasis on the cultural factors and the impact of bringing up that builds one's standpoints that differ between boys and girls (Vulić-Prtorić & Macuka, 2003). Also, the same authors state that research has shown that the levels of anxiety increase with the age and that in different age periods the level of anxiety remains relatively the same, but the contents of fears change as the child gets older. In support of these theses one can take the results from Table 1, which reveals a slightly increased presence of fear of examinations during lessons in class, given the presence of somewhat larger sample of girls in this study. However, studies have also shown that the diagnostic classifications have taken the age as a very broad category and that it, in itself, represents an indication of multiple meanings. Namely, the processes that affect the biological, hormonal and cognitive maturity do not develop simultaneously (Vulić-Prtorić & Sorić, 2001). Moreover, in 2012, in 65 countries around the world the OECD study named "The Alphabet of Gender Equality in Education" was conducted which examined the application of practical knowledge and skills, ie. mathematical, reading and scientific literacy, but not the reproduction of knowledge. In the sample of 400,000 young people aged 15, the analysis of the PISA results, with regard to gender, has shown that boys are those who achieve/d the poorest, but also the best results, while girls constantly achieve average results.

Table 4 *Mann-Whitney Test Statistics. Grouping Variable: Gender*

	TERESP	TEINTE	TEFEED	TEADAP	STHELP	TEPOIN	TEHELP	TEAGRE	FTESTS	ISATTE
Mann-Whitney U	1415,000	1521,000	1557,000	1514,500	1395,000	1480,000	1562,000	1433,000	1332,500	1570,000
Wilcoxon W	2846,000	3291,000	3042,000	2945,500	3225,000	3250,000	3392,000	3263,000	2817,500	3055,000
Z	-1,034	-,258	-,212	-,450	-1,147	-,674	-,165	-1,092	-1,675	-,138
Asymp. Sig. (2-tailed)	,301	,797	,832	,653	,251	,501	,869	,275	,094	,891

$p > 0.05$

The differences between the students with regard to the overall success achieved at the end of the previous school year (given the three independent variables – excellent, very good and good success) were tested by the Kruskal-Wallis nonparametric test. The results presented in Table 5 show the statistic significance level of 0.05 ($p > 0.05$), which means that there is no difference between the students with regard to their overall success. In support of these results one can discover numerous researches that show that teaching strategies significantly affect the classroom and school atmosphere, reducing the risk of developing antisocial behaviour and increasing the academic achievements, which indirectly affects the students' behaviour and their individual needs and requirements (Shin & Koh, 2007; Wright, John, Livingstone, Shephard & Duku, 2007).

Vidić (2010) states that in the last decades school has been perceived as an integral part of the overall educational environment within which it is important to have interactions between students and teachers, thus to expand their own potentials in desirable ways, in the development of interpersonal relationships in the classroom, the intimacy between students and teachers and between the students themselves. The same author also points out the importance of the students' wishes to learn and the interest for their teachers to be accordingly trained, as well as their own abilities to be upgraded. The research shows that this depends on their school, academic and social experiences. Children who achieve academic standing and educational requirements are more capable to develop close relationships with their teachers (Birch & Ladd, 1997; Lane, Stanton-Chapman, Jamison & Phillips, 2007). Since the ultimate goal of teaching and learning should not be the sum of knowledge of facts, knowledge should be reflected in a better understanding of oneself and others in everyday life, which implies that the students should be aware of what they learn for and the teachers should be aware of what they teach for (Previšić, 2007).

Table 5 *Kruskal-Wallis Test Statistics. Grouping Variable: Final Grade*

	TERESP	TEINTE	TEFEED	TEADAP	STHELP	TEPOIN	TEHELP	TEAGRE	FTESTS	ISATTE
Chi-Square	3,542	3,430	1,898	3,783	1,769	,215	,496	2,234	,583	,270
df	2	2	2	2	2	2	2	2	2	2
Asymp. Sig.	,170	,180	,387	,151	,413	,898	,780	,327	,747	,874

$p>0.05$

Given that during the entire primary education students in the seventh and the eighth grades of primary school are included into a series of school prevention programmes aimed at strengthening their personal and social development, as well as the development of positive and responsible relationships, the results show that the students assessed positively educational work and school. Besides, these results identify certain adjustments by their teachers during the teaching procedure in the classroom when it was necessary for the students to get the individualized approach in work on account of some specifics. In accordance with the results obtained therefore, the null hypothesis is accepted according to which there is no statistically significant difference between the students in their assessment of educational work and of the educational support as provided by their teachers or that of the students between themselves. Namely, the results suggest the existence of a kind of mutual cooperative learning that hasshown growing presence in scholastic practice (Kadum Bošnjak, 2012). The same author states that it is based on the idea that the students will more easily discover, comprehend and understand complex educational requirements if they work together and talk about what the subject of learning is. This, along with an individualized approach in teaching, contributes to the common positive educational achievements (Johnson, Johnson & Roger, 1998) for providing equal opportunities for all the students. The emphasis is on the teaching strategies that need to be planned so as to enable efficacious acquisition of academic knowledge and skills and the development of social skills and habits of students. As the basic principle of good learning the authors specify a well motivated group with a clearly defined task and the rules to be followed when solving tasks. According to Maleš & Stričević, (2000) the most important set of skills that students should adopt in school are: decision making, problem solving, creative thinking, critical thinking, efficacious communication, interpersonal skills, self-awareness, empathy, dealing with emotions and coping with stress. However, when creating school curricula, teachers should plan their lessons taking into account the needs of the students using teaching methods that will enable all the students to develop their own abilities. In determining the educational content, forms and methods of work the teachers should bear in mind the personality and needs of each and every student and should know how to respond to the challenges that they face in every class with all its specificities and diversities. Methods of teaching and leadership in a class should be diverse, they should aim at affirmation of life values and include discussions and talks embracing the whole class, but also the individual talks, with individual students (Kudek Mirošević, 2012).

CONCLUSIONS

Through the experience based on self-evaluation of a school, the objective of this study was to examine differences of opinion between the seventh and the eighth graders on the educational strategies offered by the teachers and the peer support, as provided. The study started from the null hypothesis according to which there is no statistically significant difference between the students in their assessment of educational work and educational support as provided by their teachers and that of the students between themselves. The results confirmed the null hypothesis according to which there is no difference between the students in their assessment of educational work and educational support as provided by the teachers and that of the students between themselves. Accordingly, one can say that this is a regular primary school that meets the educational support, in which students develop cooperation and unity to address the complexity of problems, developing as well mutual understanding, support and help. Such results also suggest that the students build a positive system of values through solidarity and self-respect and respect for others.

Given that the results show there is no difference in opinions shown by the students with disabilities, if compared to those of their peers without disabilities, it can be concluded that students with disabilities feel accepted by their peers in the class. This is also supported by the observation that one could recognize cooperative learning in this school, based on the use of different ways of grouping and activities that promote the climate/atmosphere ??? of social support among students. Research suggests the importance of communication, such as encouraging, explaining, suggestions etc. in order to achieve the agreeable quality of the educational process and interactions (Hodkinson, 1997; Salomon & Perkins, 1998; Peko, Mlinarević & Gajger, 2009). Teaching strategies brought about to recognize and satisfy individual educational needs of students allow teachers better identification and understanding of the students' difficulties and facilitate the selection of appropriate teaching methods and procedures. In line with this, one can discern a particular educational, social and emotional climate/atmosphere ??? and communication that promote a positive attitude towards acquiring knowledge based on individualized teaching and towards learning, in general. Besides, one could face the development of the students' ability to apply the acquired knowledge and skills in different situations and their taking over the responsibility for their learning and accomplishments achieved by such learning. On this basis, one can say that the school created the elements for further prospects of personal and professional development of teachers and students. For teachers this includes the knowledge of the teaching strategies and methods, competence to train the students to be able to evaluate and select the strategies and methods of learning that best suit them, competence to organize and examine the adoption, progression and evaluation of the students' knowledge. For students this includes the ability to apply their social skills and attitudes in different situations, becoming trained to take over the responsibility for their learning achievements and the ability to make decisions on their further educational development (National Curriculum Framework, 2010). And yet, as for professional competences of teachers, they need to be further developed for them to acquire some additional knowledge of the individual needs of students thus to overcome the often present primary reason why teachers sometimes feel discouraged when applying individualized strategies at work. Given that this research applies only to one school, the generalization of the results would require some additional research on a representative sample of students, while these results can be further used as one of the many starting points for improving and developing the quality of schools and educational standards through self-evaluation approach under the important role held by the teachers in providing their educational support and laying down recognizable and attainable educational goals and outcomes.

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THE IMPORTANCE OF RELIGIOUS EDUCATION FOR THE EARLY INTERVENTION, ADAPTATION AND SUPPORT TO CHILDREN IN PRIMARY SCHOOL

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SUMMARY

In this work, we are going to talk about the importance of religious education for early intervention, adaptation and support to children with disabilities in primary school. Through the experience of nearly 15 years in 5 elementary schools and a special elementary school in Belgrade, a good system of early intervention and support for children, parents and colleagues in the educational work was developed in practice. Religious education is designed so that every child experiences himself as being a creature of God, as a God's angel, that everyone is created as a unique and unrepeatable creature of God, who has special talents and abilities, which contributes to a child's self-confidence and self-esteem. The freedom and the diverse range of content of religious education provides opportunities for different activities to focus on skills that students with support can accomplish. Also, this versatile and creative way of work reveals the children's special talents, before other teachers are able to discover them. The organization of the class provides a peaceful and orderly atmosphere during the lesson, because every lesson begins with a prayer, which we pronounce all together quietly and peacefully. After a noisy school hallways during breaks and noisy entering the classroom, the religious education lesson brings a calm and comfortable environment from the very beginning, a ritual and a regular rhythm that give children security and soothes tension. Many books and studies have been written about the "healing"effects of the prayer, for the calm, attention and concentration. Classes bring diverse and designed content. Verbal communication is always accompanied and explained visually, ie. short and clear text on the blackboard, images, icons. Through colors, songs, stories, children are introduced to the world of their imagination. They are not exposed to stress of the evaluation and assessment tests. Groups consists of 15 students and together they make the rules of behavior and work. The experience has been great and important.

Key words: religious education, support, talents, security, self-confidence

INTRODUCTION

Religious education has been introduced in primary and secondary education in Serbia since 2001. It has caused many controversies and dispute, both the professional and the general public. There were questions about its legitimacy in the education system in "secularized world" (Berger, 1969), especially at the beginning of the new millennium. However, there is evidence of revitalization of religion and secularization of the world in recent decades, the vitality of religion (Habermas, 2001) and "intense religiosity of today's world" (Berger, 1999; 2008). Nor enlightenment, modernism,

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neither globalism were able to destroy human spirit. Human being is, according to Jung, a naturally religious, homo religiosus, "anima religiosa naturaliter": "God is a psychological fact which owns the greatest power in man" (Jung, 1938; 1977). According to Thomas Luckmann, the human religiosity comes from his biological beings (Blagojević, 2015).

To sum up – we live and work in times of "the return of the sacred" (Bell, 1978; 1986) and religious education that is given as a choice, so it is advisable to provide the best educational and cultural-educational effect for our children and let them know that they are all an unique and unrepeatable created by God and loved.

Educational work

Educational work has strategic importance for the progress, development and the future of certain society. Beside economy and defense, education of future generations also provides long-term and far-reaching consequences to the economy and defense of the country. Ancient and Islamic philosophers, psychiatrists, clerics wrote about the importance of these social influences: Confucius, Plato, Tertullian, Leibniz, Pascal, Spinoza, Erasmus of Rotterdam, Nietzsche, Fromm, Suchodolski, Comenius, Montessori, Arthur Janov, Alexander S. Neill... We decades writing about it, and prof. Dr. Svetomir Bojanin ...

The school lost its essential role in life, strategy and vision of the society in these days. We faced this problem almost a decade and a half. Early intervention should not refer to the consequences, but primarily on prevention and prophylaxis. We must protect the rights of children to education, intellectual, spiritual and every psycho-physical and social development.

Each society has its own, authentic cultural and moral form. There are specifics of the societies which are integrative part of their identities, formed on the basis of historical and religious experience. However, there are also universal values of civilization. Families and parents store and transfer the closest context of these features to the children and social system through institutions of education should refer children, future equal members of society, should influence of them in accordance with the society, its heritage, tradition, strategy and vision. Unfortunately, it is now seen in a negative context or does not see the significance at all. Every child, regardless of their skills, talents and abilities, deserves to be given an equal opportunity for integration into the social context and to be part of the community. This is possible only if the child is familiar with the values of their society they belong to, in terms of cultural, historical and religious traditions and heritage. It also includes support and encouragement of the development of mental qualities, skills, self-awareness and the ability to distinguish one person as important from the unimportant, right and wrong, obligations and rights, justice and righteousness. This contributes to the child's real understanding and acceptance of itself, its own capabilities and its own role of personal and social affirmation. If an individual feels capable, important to himself and to the community, he finds the meaning and role of its own personal life and life in society, the sense of self-importance, usefulness and contribution to the functioning of the community will give him the identity, integrity, dignity and an overall personality. Such a figure, face (face as humanity, character, moral, value, and generally accepted positive expectation) is that what educational system should (and must) provide to children.

“Our people have a deep ethical meaning of the face in their own language (facial “we” or “The man without a face“, ”Where is your face“, “He has no face” in means: he is rude...) which means organic connection between education and ethics, education and spiritual life in general. Education means a renewal of the face (pictures, icons, forms) of the God in every person, discovery and development” (Archbishop Amfilohije Radović, 2002).

If a child understands himself as a creature of God it will behave in that way. Practice has shown that young children distinguish good and bad, right and wrong. In special primary school children are explaining through drawings and paintings who is good, who is bad, what should be done, whatshouldn’t be done? They like the feeling that God “who is up in the sky where the clouds, the Sun and the Moon are “create them just like that. This causes delight and fascination among children.

Many problems in children’s behavior and development are not the result of prenatal, postnatal, or later acquired functional and physiological defects or deformation. They are often the result of inadequate educational environment. A great example is visible in Gypsies population or in vulnerable areas (social structures on the margins of societies). It is not just the result of poor nutrition, care and natural living conditions, but weaker spiritually-cultural and educational environment in which the child grows. Here we do not refer to education as literacy, learning data and definitions.

Through long wars in the history of the human race in all meridians, the children were born, starving and living in extreme conditions. Children,who survive after the end of wars, became equal members of society. Psychological and spiritual upbringing and healthy environment that encourages children’s mental development is crucial. Children of Gypsies populations often are sent into special elementary school with children with special needs and lower mental abilities. The trough is that they just hadn’t chance to grow in a healthy stimulating environment. The problem today is that more and more children grow up in such an unsupportive, non-affirmative, passive environment, although they are not marginalized from socially vulnerable areas of society. Unfortunately, many children today grow wild, not as some chosen, “cultural sort”, but as a weed, almost wild, without adequate environment that will cultivate them, to give them the quality, purpose, its own value.

We have withheld the children the spiritual, cultural, moral, educational framework that will compose a full figure, reflection, face. A picturesque wisdom attributed to our Patriarch Pavle. It says: “There are many poor among our children, where parents except money nothing else could give.”Wealthy parents that will only decorate their wild flower with set of flower pots, decoration, ribbons, preparations ... They are creating the illusion that they care about. Kids grow up alone with their peers in the virtual world of media and computer games, which do not come from the child’s world, and do not support the concept of a healthy childhood. Where should they learn valuable, universal values, norms of behavior, communication, to exchange feelings? Who is for them a living example, a pattern? What identity and integrity of children can gain if you grow your own identity, your roots? As a weed, wild, wild ... Why do we have children?

Following the development of child psychology and pedagogy through the centuries, the pioneers of the scientific disciplines are much more learned than zoologists observing animals and their babies. Cubs need a safe nest, litter, habitat ... They need an authority that guarantees the safety, security, survival, survival. They need care, love, tenderness and learning through reminders and rewards. They must be taught the skills and rules of their species to survive, learn to love and to food, to defend themand defend their loved ones. Pamper your pup is not the same thing as spoiling it. Femalescuddle their Youngers after hours of training, after hours of hunting or training for walking / flying. Pamper, to love, to seal imprinted child love and pride to become a successful individual is worthy of your own love." Set me as a seal upon your heart, as seal on your arm. For love is strong as death..." (The Holy Bible, Old Testament, Song of Solomon, 2010).

Spoiled child is child with nothing impressed in it for the future; leave it as weak, dependent child, like a toy, without a real sense of pride and joy, without success realized without information for independent living. A child is not a toy, he is not our decoration. It is a being who does not know the answers about the world in which we brought him in, and wants us to let him know. It deserves to be introduced and trained for life with the right information and the right answers. Trainable, ask and get answers, the child asks us about a new world, we ask the child about his world and needs.

"The word 'Question' on old Slavic language means' feed ', so the word Education means ' to feed ' the child the truth, experience, morality, spirituality. On these grounds education could be defined by the following short definition: Education is – the restoration and creation of man according to the face of Him who created him and his question about the light, truth, beauty and good; in a word, of all the divine perfections" (Archbishop Amfilohije Radović, 2002).

Claude Lévi-Strauss in his anthropological research in the areas of North and South America and Africa, dealt with the upbringing of children and their initiation, educational problems whining child in "Mythologiques" (Lévi-Strauss, 2011). He wrote in "Tristes Tropiques" about a family life, education and the extremely close relationship between children and parents. "When something is prohibited or dent to the child, and he hit his mother, she do not bit him back, but she denies the cleaning of the lice. This is, however, rarely happens ... It would seem that in the cleaning of the lice alike enjoy both sides; It is, moreover, considered a sign of respect and love. The natives do not punish children and I never saw them fighting, or even that they threatened beatings, except in jest" (Lévi-Strauss, 1999). Practice has shown that a similar principle applied in today's context produces results.

There is much that can be learned from anthropologists and zoologists. If you let Youngers to walk free in the large open space, they feel anxiety, uncertainty and compacted into the crowd. Their nature and needs are blocked due to the environment of this area. They feel fear. Fear paralyzes, immobilized their development and life. When you let Youngers into the fenced meadow, they run wild, dispersed, nibbled grass, run, feel safe and protected no fear and no blockages. So it is with children and upbringing. Children should have a fenced, safe space, they need to see and feel the boundaries within which they feel safe. These boundaries protect them. All around us are examples of how a child looks without restrictions. Response of the adult (who should be more experienced, more aware, more responsible) when no restrictions?

The Apostle Paul says: “You can do whatever you want, but it is not all in our favor” (The Holy Bible, New Testament, Epistle, 2010). Children are educated to have rights and freedom; placing them in abstract conditions in even educators they do not believe. You do not have borders, but to have creative freedom in education. The book “The free children of Summerhill” do not talk about that freedom.

When children reach 18 years and ceased to be children, they face limits, restrictions, not respecting the law, justice, and equality. There is a slogan of the student protests: “Some are more equal than others!”

Children are told about the endless possibilities, but it does not enable them to grow up and to be abolished. And then, what does happen to the children? They hit hard to the ground of reality.Their colorful helium balloons are popped by society. This creates mental disorders, depression, and breakage young souls. Push children in despair, alcoholism, drug addiction, vices ... They get the right information, instruction, learning about the world in which we brought them. Spinoza spoke about that last night in his “Ethics” that young man would fail if not prepared for the future. Spinoza’s “sub specie aeternitatis” look to the future, eternity, duration (de Spinoza, 2011).

Dr. Viktor Frankl talks about modern diseases of young people, the existential vacuum, the noogen neuroses, the destructiveness of life “between suffering and boredom“ (Frankl, 1994). Through educational systems children are taken away deducted instincts and abilities that give guidance and safety framework and orientation provided by tradition and ethical value system. Everything is working against the child. In the United States and countries in Western Europe is growing numbers of depressed children and children who are subjected to psychiatric and neurological drugs, premature diagnoses. Where are the children’s rights? Where is the freedom of choice? Where are these children endless opportunities and restrict? “The second killer of American children (after drugs) is depression ending with suicide” (Frankl, 1987).

Education process is a fundamental process which creates from younger being the real mature human being. It is planned and the complex process of developing all of the child’s abilities, senses, characteristics, feelings and characteristics. The primary process begins in the womb, through mother’s love and communication with the child, and continues through socialization and mastering basic skills in a warm family environment affirmative, to school. Almost everything depends on beginning. This depends on society. There is no influence and importance of family any more. All babies are able to talk, but they will learn to speak their mother tongue, i.e. language of the community of their environment, their home and their mother. They will get the habits and learn behavior towards others and towards society by the relationship and attitude of their parents towards the same. Respect, love, animosity, taste, style, attitude of parents towards the current events, in the early stages of child development formed mapped behavior in children. A primary school teacher in working with first graders in the first months observed how the primary educational process had a child in the family, what rule applies, whether the child is growing in a healthy social-emotional and stimulating environment, whether the family is (dis)functional.

Secondary education process should be continued through the child welfare system and the educational process. “Do people really think that the school is still educating children?!” (Bojanin, 2011). This is the true picture of the state and society. Unfortunately, now everything is working against educational institutions and parents, as well as the institutions themselves, and the parents themselves. The society and the state apparatus devastated the authority of parents, educators and teachers. Medias and institutions became weapons against children. Everything is pointless; there is no meaning of education for children. "Has been reset living meaning" (Frankl, 1987).

Education, ordinary and special, too, should be composed according to the nature of the child and should have a goal to change child in a positive sense, to improve him. Adults, intelligent persons, change themselves in order to avoid the same obstacles and problems and to learn to overcome them. Does school help children and support their needs and opportunities and how it molds and plaster,has investigated Dr. Svetomir Bojanin and presented in his book "School as a disease" (Bojanin, 1991).

Prayer

Through the experience of nearly fifteen years in five primary schools and in a special elementary school in Belgrade, I developed practical, good system of early intervention and support for children, parents and colleagues in the educational work. Religious education is designed so that every child experiences himself as an angel of God, as a creature of God, created as a unique and unrepeatable, which has special talents and abilities, which contribute to a child's self-confidence and self-esteem. "We exist because God loves us " (Špehar, 2015).

The class organization allows peaceful and orderly atmosphere in the classroom, because it begins with a prayer, which we pronounce all together quietly and calmly. After a noisy school hallway during a break among the classes and after entering the classroom, subject Religion education brings calm and pleasant environment on the beginning to the students. Its specific rituals establish rhythm that gives children the security and soothes tension. A lot of books and studies were written about healing effect of prayer to achieve serenity, attention and concentration. "... To pray is to ask for prayer, as well as internal needs, it can't be conformist behaviour or it can't be influenced by the pressure of the environment " (Radisavljević Ćiparizović, 2016). Kids love peace while they are praying. For them this is song to God, call to Him to love us just as we are. Students like songs that can be speak out loud so they can hear themselves. They like when other kids can hear them too. "God, hear my prayer and bowed my attention to prayer" (King David, Psalm 60.1).

"Once again I repeat: it is important that children sing hymns in order, even when they do not understand anything yet, listen to the holy words of prayer. Furthermore, what is said from the soul to the soul not the same as the things that have been identified (church) constitution. It is not, therefore, sufficient to the child read the morning or evening prayer, they should be voice so that they reach out to some of his depth, although a child not yet conceived mind. It seems to me that this is the most important thing" (Mitropolit, Archbishop Anthony Blum, 2006). Small child is not aware of his existence, the existence of his parents and on the concept of love, he feels the closeness and love his parents.

So it is with God. Erasmus has spoken about the presence of God: " Summoned or not summoned, God is always there" (Špehar, 2016).

A child which needs support of pray feels bond and closeness while he is praying. Nobody looks at him as different: everybody hears him, and he is heard by others. Children have a strong imagination and own inner world, they often speak or sing prayer, even while they are doing something else in the class time.

One girl with special needs heard in the church for the first time one children's song. She covered her ears and shook hands, nodded, because she didn't want to listen. We switched off the song. However, the next time he showed with her hand to replay the same track, which was done, in a low tone and only once. Such children are very sensitive and do not like noise. A month later, this very girl started to sing this song, first softly, then louder. She knew the whole song by heart.

Symbols

Symbols are polyvalent, full of energy and emotions. In religious education they are used in the form of pictures and movies, as well as polysemic and ambiguous media that encourage the development of imagination and creativity in an early age because they develop ideas, freedom of mind, enhance intellectual abilities and understanding. In this way, children develop a common field of experience, the field of communication.

When they understand and learn to use letters and numbers, children also learn symbols for feelings and occurrences. Each refers to its cultural and social experience and each symbol has its form and content in a particular context. It is interesting that children from different climates, religions and social circumstances have common symbols and their meaning: a heart for love, for happiness smiley angel as a symbol of good which is created by God, the house is their home, a book is a symbol of the school (Špehar, 2015).

Activities and dynamics of time

Educators have been arguing for decades about the best way of learning. Children learn best through living authentic contact, empathy, dynamism and experience. Every religious class has just such content. Used didactic aids abound in sound, colour and movement encourages learning and development. Freedom and diverse range of facilities provide opportunities for different activities focus on skills that students can be realized with teachers' support. In a smaller group and relaxed atmosphere of the time it's easier to discover abilities and talents of children rather than the other classes with intensive applications and tasks. There is no such a claims and there is no emphasize the inability of students to respond. Religious teacher has enough time to provide adequate access to each individual child.

The teacher or homeroom teacher always collects specific information about each child, especially the ones with disabilities. The plan and strategy depend on type of disabilities and available information. Teacher is looking for the most efficient way for the student through various methods, organization of time and space. It is demonstrated by the following example from practice.

One boy had a problem with changing area or space where he feels secure. He was permitted to choose the place where he would sit and a friend he would sit with. Since he felt safe once in the classroom, it is not good for him to go to the multimedia cabinet where teacher had planned to show cartoon “Bible Stories”. Teacher showed cartoons next time in his classroom. It allows him to feel secure, sit where he decide to or change the place if he wants to do so.

It is also proofed that it is not advisable to introduce a lot of different contents and / or tasks simultaneously, because students need a peaceful and regulated environment, regular rhythm instead of constant change. They do not need to divert attention while engaged in one activity. The work plan in the future should be notified in advance, while information and guidance on the time should be short and clear. It is best to use only one drawing, one picture or an icon in one story and present a precise, direct and consistent message. At the same time, take care about that humorous comments are not suited for children who need additional support. These students need constant support to understand the hidden meaning and draw conclusions, so teacher has to explain the situation and adequate solution several times.

When a child is upset, it would be good to allow him to walk and, if needed, teachers can hold his hand. If you do not want to participate in such an activity, you should ask him what he would rather work.

It should be accentuate that teacher has to have the different approach to the child with ADHD and to the children with disabilities. A child with ADHD can do multiple activities at the same time that there are multiple concurrent perceptual sensations: music, presentations, images, working material. Such student needs different types of activities for a class time. Teacher should avoid such a dynamic in the work with disability student because that makes him tired and irritable. Teacher should choose specific teaching techniques in the classroom according to the students’ needs: individual or group work, visual or audio means. Students with disability needs more time to complete the appropriate action. These students generally want to work individually, but they like to be with other children. They should be observed, but it should be offered them to have individual connections with other students in group.

Practice has shown that it is advisable to look in the direction of the child who needs support while speaking at the time, but not directly to the child. Teacher should insist that other children should not all speak in one voice and to stand up when they have something to say.

Children who need support do not like nicknames or affectionately speech. They need to be addressed by name. If they are upset, it would be good to let them look through the window. If they start to talk what is going outside, it will be a signal that the tension is.

Presentations used on the class should not be full of different effects but reduced and clear. New concepts should be explained in several ways. Text on the board must be short, beautifully written in large letters, with the drawings. It is best to repeatedly read and explain the text. Handout of time should be provided for a personal assistant who accompanies the child to be able to work together.

Children love nature, sun and animals. Such preferences should be used in various ways in the classroom. Through the story that the Creator has created a diverse world, one can point out that there are hundreds of different species of trees: high, low, spindly, bushy, deciduous, evergreen, etc., but that is all worth and important in its own way. It is the same with flowers, houses, kittens and birds. The differences among the students can be explained through different modes of chirping and flying. People are different in many ways, even their own brothers and sisters. In this diversity of looks, colours, sounds and movements is the beauty of the world around us.

The same can be substantiated through examples from one's own life, presenting ones talents and inclinations and close relatives or family members. Also, we should say that we also were not absolutely successful in school, but that we were trying very hard. That personal contact and common emotions are necessary to support children in learning, development and independence.

It is necessary to tell the child that he has been successful and that lectures can be completed whenever he wants.

Love

This topic is the last, but not the least. Love is the crown of all. It is written a lot about the role of love in the educational process. Love is simply necessary, like air, water or salt ... To succeed in any business, you need is motivation. Love is the strongest motive. The Council was created out of love and out of love. "Hymn of Love" written by the Apostle Paul in his "Letter to the Corinthians" almost 20 centuries explains all "... if you do not have love, you are nothing ..."

We are witnesses of disorders of meanings of love, freedom, emotion. Distances are increasing, familiarity and confidence declining? We've lost the sense of verbal and non-verbal displays of affection. Everything is cyber, impersonal, separated, and false. The family has lost its role of first love subject and object; where child learns about love, intimacy, trust, giving, sacrifice for love. The whole history of mankind is a story of love and sacrifice for love that is freely yields.

Beautiful fairy tale by Oscar Wilde "Selfish giant" speaks about love, sacrifice, love wounds, the changes that caused by love. It is censored in our school, the third grade, many years ago, at the beginning of the 21st century and the new millennium, giving itself the right and freedom to hide timeless literary work of the great author. Due to the particular interests and mediocre loyalty, the passage about the wounds of love on a little boy (a symbol of Christ), whom love is caused a fundamental transformation of selfish, self-centered giant. There is no point, the main idea, meaning that well and love win ... This is the way the children look at us, their parents and teachers.

Dr. Zoran Kindic in his study "The role of love in education"says: "The fact that you are in school ignored the truth and love, students are accustomed from an early age to follow an egotistical interests" (Kindić, 2013/2014).

If we do not learn and show love to children in school, then our time is lost in many ways, our efforts are not worth much. Children feel if we love our work, if we love what we do, even if we love them, do you believe in what you are talking about. This is obvious in work with children who have special needs because they are much more sensitive. For them, no apologies, corrections, next time or "it was not my day"... They are crying out for a healthy, supportive, affirmative environment that will help them to develop. The main ingredient in all of this is love. Flowers feel the love, care, feel our talk and tenderness. They progress better, return us with their beauty. Flowers listen and love Mozart and Tchaikovsky. What we provide and offer to our children? Do they?

CONCLUSION

This work is not only an overview of many articles about the importance of religious teaching, about working with children who need support, about pedagogy and similar themes. This work is concise personal experience and practice of a religious teacher.

We learn mostly from our own experience, so the teachers, who use different teaching methods are very valuable for early intervention and special education. Exchange of experience, education, cooperation and adequate literature can facilitate education and involvement of the child in the environment to help teachers prepare and implement the activities in the work and parents to provide support and empowerment to influence the training of their child for independent life. The child is a God's creation and his soul need peace, love, care and attention. We have obligation to do so and responsibility to provide it.

"And one day each of us will stand
In front of our Heavenly Father, and will say:
'Here I am Lord, and here're my children, my students'.
We will be judged after our children's life" (priest Artemije Vladimirov, 2005).

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