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THE INFLUENCE OF SPEECH THERAPY TREATMENT ON THE DEVELOPMENTAL ABILITIES OF PRESCHOOL CHILDREN

Original scientific paper

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ABSTRACT

The main objective of the study was to determine the developmental abilities of preschool children before and after six months of speech therapy treatment, and to examine the impact of the time of initiation of speech therapy treatment on the developmental abilities of children. The sample consisted of 35 children (20 male children and 15 female children), and all respondents reported early intervention due to speech and language difficulties. The age of the respondents ranged from 25 to 60 months. After conducting interviews with parents, taking anamnestic data, professional speech therapy diagnostic-observational procedure and determining speech-language disorders, the children underwent speech therapy treatment. After six months, a final assessment was made and the results showed statistically significant progress in all variables describing developmental abilities in children. The predictor "Time of treatment initiation" also had a statistically significant impact on all tested variables of developmental abilities of preschool children. The results showed that speech therapy treatment enables significant progress in all developmental areas in children, i.e. that progress in one development area follows the development of other areas.

Keywords: *social development, speech, thinking and perception, fine and gross motor skills, early intervention*

INTRODUCTION

Child development is a dynamic, interactive process, which includes a sequence of changes in the characteristics, abilities and behaviour of the child, as a result of which the child changes, and becomes larger, more skilful, more capable, more sociable and adaptable. The relationships that a child builds first with close people, and then with other people, belong to the emotional and social domain of development, but it is not possible to separate them from communicative and cognitive development (Ljubesic, 2005).

Before attending school, a child must reach a certain level of physical, social, mental and emotional-motivational development. The child should be able to perform mental actions, to notice similarities and differences between objects and phenomena from the surrounding world, should be able to self-control and plan their own actions. No less important is the development of fine motor skills, visual-motor coordination, correct pronunciation of voices and the appropriate degree of phonemic hearing. These are necessary conditions for successful verbal communication and for mastering reading and writing skills (Ivanovsky & Gadasin, 2010). The child must be socially involved in the surrounding world, in its environment, and must be motivated to learn more about it in order to understand how to communicate with others (Bartolotta & Schulman, 2010).

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Hasanagic (2015) explains that psychomotor skills, muscles, intellectual functions, creativity, and especially social behaviour are developed and improved through play.

Simanova & Peeters (2015) point out that there is a close connection between fine motor skills and the development of speech and language. For this reason, speech therapists encourage noticeably rich activities, such as drawing with fingers, playing with water or sand, and manipulative activities involving small objects (paints, buttoning, etc.) in children with speech and language difficulties. Such activities help to form new neural connections that are needed for sequence planning and fine motor control. Iverson (2010) points out that the development of speech and language should be viewed in the context of the whole body in which, among other things, the development of the speech system is embedded. In early childhood, there are significant changes in the ways the body moves and the ways the body interacts with the environment. This affects the development of skills and experiences that play an important role in the development of speech and language. In preschool, fine motor skills such as buttoning, painting, writing, activities that involve eye-hand coordination and fine muscle coordination, also progress greatly.

Socio-cognitive development is a special form of understanding the world around us, when the child becomes interested in itself and the people around. The notion of oneself develops gradually, by the "separation" the child from the environment. After the age of 18 months, the child begins to mark itself in the third person or with its own name, as others call it. At the beginning of the third year, most children recognize themselves in the photo and start using the pronoun "I". Awareness of others develops simultaneously with the development of the notion of oneself, when the child becomes aware of its difference from others. Speech gradually plays an increasing role in solving tasks. Thus, observing a three-year-old, we can conclude that it thinks and speaks at the same time, that is, speech and intellectual activity that is focused on practical problem solving. Research on perceptual-representative thinking shows, that it is always associated with speech processes, but this is not yet a conceptual reflection (Hasanagic, 2015). Speech and language development is a useful indicator of a child's overall development and cognitive ability and is related to school success. Identification of children at risk for developmental delay or related problems may lead to intervention services and family assistance at a young age, when the chances for improvement are best (Nelson, Nygren, Walker, & Panoscha, 2006). The importance of early communication lies in its great role in cognitive and socio-emotional development, but also in the fact that the features of early communication provide us with information about the whole developmental profile and are, therefore, very important for an early detection of some disorders (Ljubesic, 2012).

Difficulties in mastering language requirements can be a serious problem in an individual's life, as they affect the success of the individual's educational, social and cognitive potential, and impair quality of life (McLaughlin, 2011). Many children have difficulties in one or more areas of speech and language development. Some children have difficulty with phonology, i.e. pronunciation, and in that case their speech is sometimes difficult to understand. Other children have difficulty with grammar, and are unable to spontaneously adopt grammar rules. In that case, their language is dysgrammatic. Some children find it difficult to use language to express their needs. Likewise, it should be noted that some children have problems in several speech-language areas at the same time (Apel & Masterson, 2004). The process of providing early intervention services begins with the birth of a child and lasts until school starts, and includes providing support to children, their parents, other family members, as well as information, rehabilitation and counselling (Kosicek, Kobetic, Stancic, & Jokovic Oreb, 2009). Cvetko (2004, according to Milic Babic, Franc & Leutar, 2013) points out that intensive early intervention, i.e. special education and speech therapy support, care for schooling, and the availability of data on the exercise of various rights are important for achieving progress.

Early intervention consists of multidisciplinary procedures for children from birth to five years of age that promote the child's health, well-being, encourage developmental development, reduce developmental delays, eliminate existing or prevent possible disorders, prevent functional decline and promote adapted parenting and general family. These goals are achieved through individual developmental educational and therapeutic procedures for children, which are carried out together with simultaneously planned support for their families (Blauw-Horpers & Hadders-Algra, 2005, according to Ljutic, Jokovic Oreb & Nikolic, 2012). The role of speech therapists consists in the prevention of speech disorders with direct work with children and parents, as well as other professional profiles and work on improving children's speech and language skills (Dobrota-Davidovic, 2008).

The main goal of this study was, as part of early intervention, to determine the developmental abilities of preschool children before and after six months of speech therapy treatment and to examine the impact of time of speech therapy treatment on the developmental abilities of preschool children.

METHODS

Sample of respondents

The sample consisted of a total of 35 children aged 25 to 60 months, of whom 20 were male and 15 were female. Based on the paediatric findings or the findings of a specialist doctor, the respondents were referred to the Department for Early Intervention at the Public Institution Centre for Children and Adults with Special Needs in Zenica - Doboj Canton.

After conducting interviews with parents, taking anamnestic data, professional speech therapy diagnostic-observational procedure and determining speech-language disorders, the sample included preschool children who had difficulties in speech-language development and who after initial examination underwent speech therapy treatment in the Centre.

Sample variables

The variables used in this study can be divided into two groups:

1. Anamnestic variables: Gender: male subjects, female subjects; Age of the child expressed in months; Age of the child at the time of starting the speech therapy treatment: 25–36 months, 37–48 months, 49–60 months;
2. Variables for testing the developmental abilities of preschool children: Social development; Fine motor skills; Gross motor skills; Speech; Thinking and perception.

Method of conducting research and measuring instrument

The research was conducted in the Public Institution Centre for Children and Adults with Special Needs in Zenica - Doboj Canton at the Department for Early Development Promotion and Early Intervention for Children with Special Needs. Based on the paediatric findings or the findings of the specialist doctor, the children were referred for an expert assessment at the Institution. After the speech and language disorders were identified, each child underwent speech therapy treatment. Speech therapy treatment was performed once a week for 60 minutes. During the work with the children, the parents attended the exercises, and after the work was completed, they received written guidelines for working at home. Where the parents obstructed the work of the speech therapist with their presence, in that case they were allowed to observe the treatment from another room through a special window.

The research was conducted in two phases. The first phase involved an initial speech therapy assessment that was performed immediately after the children attended the Institution. The children were then included in a speech therapy treatment that lasted six months. The final speech therapy assessment was performed after six months of speech therapy treatment. The "Strassmeier Development Test" (Entwicklungstest) (Strassmeier, 2002) was used in the initial and final assessment to assess developmental abilities in preschool children. This test is intended for children aged 0 to 60 months. The test provides insight into the overall development of the child in the following areas: social development, fine motor skills, gross motor skills, speech and thinking and perception.

Social development consists of a total of 60 tasks by which we assess a child's ability to take care of themselves and social development. Items include interests and assessment of social relationships, ability of self-sufficiency, as well as development in the field of play. Fine motor skills with a total of 40 tasks measure the ability of dexterity and visual-motor coordination of fingers and hands. Gross motor skills consist of a total of 40 tasks, and measure the child's ability to control its head, crawl, sit, stand and other complex actions. Speech consists of a total of 60 tasks by which we assess a child's ability to expressive and receptive language, as well as the ability of semantic and syntactic aspects of language competence. Thinking and perception consists of a total of 60 tasks that show the interdependence that exists between cognitive development and the acquisition of language competence, and evaluates the areas of comprehension of objects, concepts, shapes, colours and concept numbers, classifications, series, acoustic perception, visual and tactile perception, semantic concepts, as well as an understanding of relationships and interdependencies.

When assessing the developmental abilities of children, if the child performs the task completely correctly, then the sign "+" is entered in the provided field. If the child does not know a certain task, i.e. it is not adopted in the pattern of behaviour, in that case the sign "-" is entered in the provided field. If a certain task is partially adopted by the child, then the sign "+/–" is entered in the provided field.

During the assessment, we follow the tasks according to certain scales up to the part that refers to the chronological age of the respondents. Each task that we mark with a "+" in the areas: social development, speech and opinion and perception counts as one month. Thus e.g. if we test a 25-month-old child on the Speech scale, and if he or she has 15 positive responses within tasks appropriate to his or her chronological age, we consider the speech subject to be at the 15-month-old level. The difference in the calculation appears in the scales of Fine Motor Skills and Gross Motor Skills, where we have 40 tasks for assessment, and we count one positive answer as a month and a half. After the assessment, the developmental profile of the child is obtained, which gives us a numerical and visual picture of how much the child deviates or not in relation to the chronological age.

Statistical data processing

The survey data were processed in the statistical package SPSS 20.0 for Windows. Statistical significance was taken into account for $p < .05$. Basic statistical parameters were calculated, and tabular and graphical presentation of results was performed. t-test and regression analysis were used to test the set research hypotheses.

RESULTS

The results obtained in Table 1 show that the study included a sample of 35 subjects, of which 20 subjects were male and 15 subjects were female. The mean age of male respondents was 49.15 ± 10 months, and the mean age of female respondents was 49.40 ± 10.06 months.

Table 1. Gender and age of respondents

		Age	
Gender	**N**	**AM**	**SD**
Male	20	49.15	10.00
Female	15	49.40	10.06

Figure 1 shows the distribution of respondents in relation to the time of initiation of speech therapy treatment. It can be seen from the figure that the largest percentage of respondents (42.85%) started treatment between 37 and 48 months, while the smallest percentage of respondents started treatment between 25 and 36 months (22.85%). The percentage of respondents who started speech therapy treatment between 49 and 60 months is 34.28%

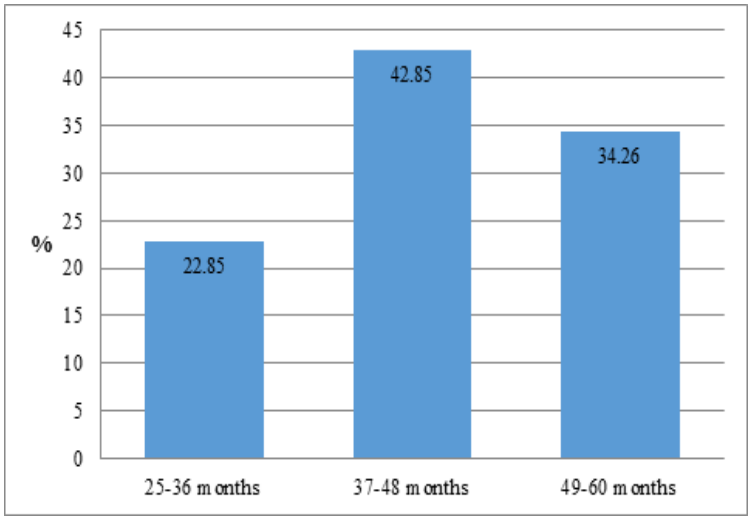

Figure 1. Distribution of respondents in relation to the time of initiation of speech therapy treatment

Table 2 shows the results of descriptive statistics of developmental abilities of preschool children in the initial measurement, i.e. before the implementation of speech therapy. The obtained results in relation to the variable "Social development" show that the arithmetic mean is 38.51 ± 10.45, while the minimum and maximum results range from 11-51. The arithmetic mean of the variable "Fine motor skills" is 37.03 ± 12.25, the minimum and maximum results range from 8-53.5. The arithmetic mean of the variable "Gross motor skills" is 39.31 ± 11.89, "Speech" 28.97 ± 12.48 and the arithmetic mean of the variable "Thinking and perception" is 36.03 ± 11.5.

Table 2. Descriptive statistics of developmental abilities of preschool children in the initial measurement

Variables	AM	SD	MIN	MAX
Social development	38.51	10.45	11.00	51.00
Fine motor skills	37.03	12.25	8.00	53.50
Gross motor skills	39.31	11.89	11.00	54.00
Speech	28.97	12.48	5.00	48.00
Thinking and perception	36.03	11.50	9.00	53.00

Table 3 shows the results of descriptive statistics of developmental abilities of preschool children in the final measurement, i.e. after the speech therapy treatment. The obtained results in relation to the variable "Social development" show that the arithmetic mean is 45.29 ± 11.11, while the minimum and maximum results range from 14-60. The arithmetic mean of the variable "Fine motor skills" is 44.71 ± 12.22, the minimum and maximum results range from 14-60. The arithmetic mean of the variable "Gross motor skills" is 45.70 ± 13.23, "Speech" 38.91 ± 12.19 and the arithmetic mean of the variable "Thinking and perception" is 44.06 ± 11.17.

Table 3. Descriptive statistics of developmental abilities of preschool children in the final measurement

Variables	AM	SD	MIN	MAX
Social development	45.29	11.11	14.00	60.00
Fine motor skills	44.71	12.22	14.00	60.00
Gross motor skills	45.70	13.23	6.00	62.00
Speech	38.91	12.19	14.00	58.00
Thinking and perception	44.06	11.17	16.00	58.00

In order to determine the differences between the initial and final measurement in the developmental abilities of preschool children, the t-test was applied (Table 4). Based on the obtained t-test results, it can be concluded that there is a statistically significant difference between the initial and final measurement, i.e. before and after speech therapy treatment on all measured variables: social development (t = -11.13; p = .00), fine motor skills (t = -15.23; p = .00), gross motor skills (t = -5.97; p = .00), speech (t = -12.26; p = .00) and thinking and perception (t = -16.95; p = .00). Given that the t-test has a negative sign, these results support the final measurement, i.e. the results show that after six months of speech therapy treatment, there was an improvement in the developmental abilities of preschool children.

Table 4. T-test results between initial and final measurement in developmental abilities

Variables		AM	SD	SE	t	p
Social development	**Initial**	38.51	10.44	1.76	-11.13	**.00**
	Final	45.28	11.11	1.87		
Fine motor skills	**Initial**	37.02	12.24	2.07	-15.23	**.00**
	Final	44.71	12.21	2.06		
Gross motor skills	**Initial**	39.31	11.89	2.00	-5.97	**.00**
	Final	45.70	13.22	2.23		
Speech	**Initial**	28.97	12.48	2.10	-12.26	**.00**
	Final	38.91	12.19	2.06		
Thinking and perception	**Initial**	36.02	11.49	1.94	-16.95	**.00**
	Final	44.05	11.16	1.88		

Regression analysis was used to determine the influence of the time of initiation of speech therapy treatment on the developmental abilities of preschool children. The results of the multiple correlation coefficient and the square of the correlation coefficient are: social development: r = .869; r^2 = .75; Fine motor skills: r = .84; r^2 = .71; Gross motor skills: r = .83; r^2 = .69; Speech: r = .79; r^2 = .63; Thinking and perception: r = .84; r^2 = .71. The significance of the multiple correlation coefficient and the square of the correlation coefficient was tested using the F-test with 1 and 33 degrees of freedom, and were found to be statistically significant for all analyzed variables (p = .00). Based on the multiple correlation coefficients, it can be concluded that 75% of the variance of "social development", 71% of "fine motor skills", 69% of "gross motor skills", 63% of "speech" and 71% of "thinking and perception" can be explained or predicted under the influence of speech therapy treatment. Table 5 shows the results of the beta coefficient, which represents the standardized partial regression coefficient. From the table it can be seen that the predictor "Time of initiation of treatment" had a statistically significant impact on all applied variables of developmental abilities of preschool children.

Table 5. Influence of treatment initiation time on the developmental abilities of preschool children

Dependent variables	Predictor	Beta	F	p
Social development	**Time of initiation of treatment**	.94	114.84	**.00**
Fine motor skills	**Time of initiation of treatment**	.90	74.61	**.00**
Gross motor skills	**Time of initiation of treatment**	.89	93.26	**.00**
Speech	**Time of initiation of treatment**	.89	72.51	**.00**
Thinking and perception	**Time of initiation of treatment**	.90	112.89	**.00**

DISCUSSION

The first years of a child's life represent the most important period in which the foundations of social and mental development are laid. In order to prevent the occurrence of various difficulties or to alleviate already existing difficulties, early stimulation of the overall development is very important, which enables the child to experience various timely experiential behaviours that are necessary for normal growth and development. Early intervention is based on the individual needs of the person/child by adapting the way of adoption and learning to the needs of the child. Given that communication is a dynamic process, and that it is the result of the development and acquisition of various knowledge, abilities and skills (cognitive, socio-cognitive, perceptual and motor), and these skills are built through continuous interaction between the child and the environment, it is impossible to encourage communication without affecting the overall development of the child.

For adequate development, a child needs a stimulating environment, that is, it needs our presence, reciprocity, a good speech model with which it will share its thoughts, feelings and desires. It is also important to point out that the earliest period is the most important period of time in which speech therapists, as well as parents, can in the fastest and most effective way to encourage children to develop their speech, language and other skills. Analyzing the sample in this study, and observing the age of children on attending and application for early intervention services, we can point out that the largest number of children who applied for early intervention due to speech and language difficulties are aged 37-48 months, followed by a group of children ages 49–60 months. Unfortunately, the smallest number of children in the sample is at the age of 25–36 months, when it would be desirable to start treatment and when speech therapy work should show the best treatment results in the shortest period of time. Similar results are stated by Dobrota - Davidovic (2008) in a research - at the age of 0 – 2 years there were no patients, from 2 – 4 years there were 13% patients, from 4 – 6 years was 25% of patients, from 6 – 7 years there was 22% of patients, and over 7 years there was 40% of patients.

This research also examined the developmental abilities of preschool children in whom, as the main problem, the presence of speech and language difficulties was highlighted. After the initial assessment of the overall development, the children underwent individual speech therapy treatment, which was performed once a week for an hour. During the work, the parents of the children were present during the treatments, and after the treatment was done they received written guidelines for work at home, because the area of early intervention pays great attention to parents as active participants in the treatment.

When it comes to the variable "social development", the initial assessment showed the value of the arithmetic mean 38.51 ± 10.45, the final assessment showed a value of 45.29 ± 11.11. The value of the arithmetic mean of the variable "fine motor skills" in the initial assessment was 37.03 ± 12.25, and the value during the final assessment was 44.71 ± 12.22. The arithmetic mean of the initial measurement of the variable "gross motor skills" was 39.31 ± 11.89, the arithmetic mean of the initial measurement of the variable "speech" was 28.97 ± 11.89 and the arithmetic mean of the initial measurement of the variable "thinking and perception" was 36.03 ± 11.5. After six months, the value of arithmetic means for the variable "gross motor skills" was 45.70 ± 11.17, for the variable "speech" 38.91 ± 12.19 and for the variable "thinking and perception" 44.06 ± 11.17. According to the obtained results, significant progress is noticeable in all development areas. As already pointed out, early intervention at the centre always has parents, given that parents spend the most time with their children. Therefore, support and counselling work with parents is an important segment in speech therapy treatment. The results of research by other authors were quite similar, i.e. the results showed that speech therapy treatment has a positive effect on developmental abilities in children.

Weinert et al. (2008, according to Gasteiger-Klicper, Knapp, & Kucharz, 2010) state that language competence is of great importance in terms of a child's cognitive, social and emotional development, its educational flow and participation in society. Weinert & Lockl (2008, according to Gasteiger - Klicper, Knapp, & Kucharz, 2010) point out that within the professional literature in terms of speech development, on the one hand, the importance of active speaking ability of children within their experiential space is stated, and on the other the importance of imitation, model orientation, expansion, modification, and stimulation. Assessment of speech and language development is a prerequisite for successful speech therapy encouragement. Ehlich et al. (2007, according to Gasteiger - Klicper, Knapp, & Kucharz, 2010) state that measures to encourage children in this area make sense only when they are performed on the basis of individual, targeted diagnostic procedure that forms the basis for optimizing individual treatment concept (Gasteiger - Klicpera, Knapp, & Kucharz, 2010). Which speech-language therapy in which disorder and at what age in children shows the most effective results cannot be stated with certainty (Suchodoletz, 2010).

Suchodoletz (2010) in his paper thematizes the short-term and long-term effects of speech-language therapies based on various studies and finds that the effects of speech therapy are slightly better in children who have been involved in the stimulus for more than eight weeks. Buschmann (2003) points out that research from Anglo-Saxon countries show that early intervention in the field of speech and language can have a positive effect on the future development of speech in children and the correction of existing difficulties. Both child-centred and parent-centred approaches are effective, as they are primary in the process of communicating with the child in preschool. For the German-speaking area, Buschmann (2003) develops the so-called "Training of parents for early speech stimulation" whose application shows a positive impact primarily on the correction of speech difficulties in children. In order to evaluate this method, Buschmann formed two groups (children included in the training and a control group that was not included in any form of treatment until the age of three). Parents of children involved in early speech training have a better understanding of the nature of the difficulties, feel safer and 98% of them are happy to recommend other parents with similar or the same problems to apply and implement the training.

The results show that children whose parents were included in the training at the first control examination (aged 2.5 years) showed a significantly higher degree of speech development compared to the control group. At the age of three, the children enrolled in the program showed results in standardized tests that corresponded to their chronological age. In the control group, only ½ children achieved the same results.

It is important to note that early intervention does not begin with a diagnosis because the path to a final diagnosis is often very long and indirect. Early intervention should be started before diagnosis can be made. It must begin at the moment when the existence of the first possible signs of developmental deviation is noticed (Ljubesic, 2003). The role of the child itself and its activities in its own development created the metaphor that the infant is a scientist in the cradle (Gopnik, Meltzoff, & Kuhl, 2003, according to Ljubesic, Cepanec, Ivsac Pavlisa, & Simlesa, S. 2009).

CONCLUSION

Preschool children undergoing speech therapy treatment as part of early intervention showed statistically better results in the final measurement, compared to the initial measurement in all variables describing developmental abilities, i.e. in the variables: "social development", "fine motor skills", "gross motor skills", "speech" and "thinking and perception". Based on the above, we can conclude that speech therapy treatment within the early intervention achieves significant progress in all areas of development. The timing of initiating speech therapy treatment has a significant impact on treatment outcomes. The results showed that children who start speech therapy at an earlier age progress faster in all developmental areas, thus avoiding additional problems that occur due to the absence or delay of speech and language development.

As part of the early intervention, speech therapists are working to encourage all areas of development, with an emphasis on the area of speech and language. By increasing language competence, children interact more easily with their peers, and their play becomes richer. Speech therapy treatment also significantly increases the academic knowledge of children, which allows them to find their way around school more easily. The role of speech therapists, as a member of the professional team in early intervention is important, because professional speech therapy work prevents and alleviates speech and language difficulties that could later grow into even more complicated and difficult problems in various spheres of life.

It is recommended that parents, if they suspect a delay in the child's speech and language, seek the help of a speech therapist as soon as possible. Also, speech therapists should pay great attention to working with future parents in order to prevent speech-language and other developmental disorders.

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