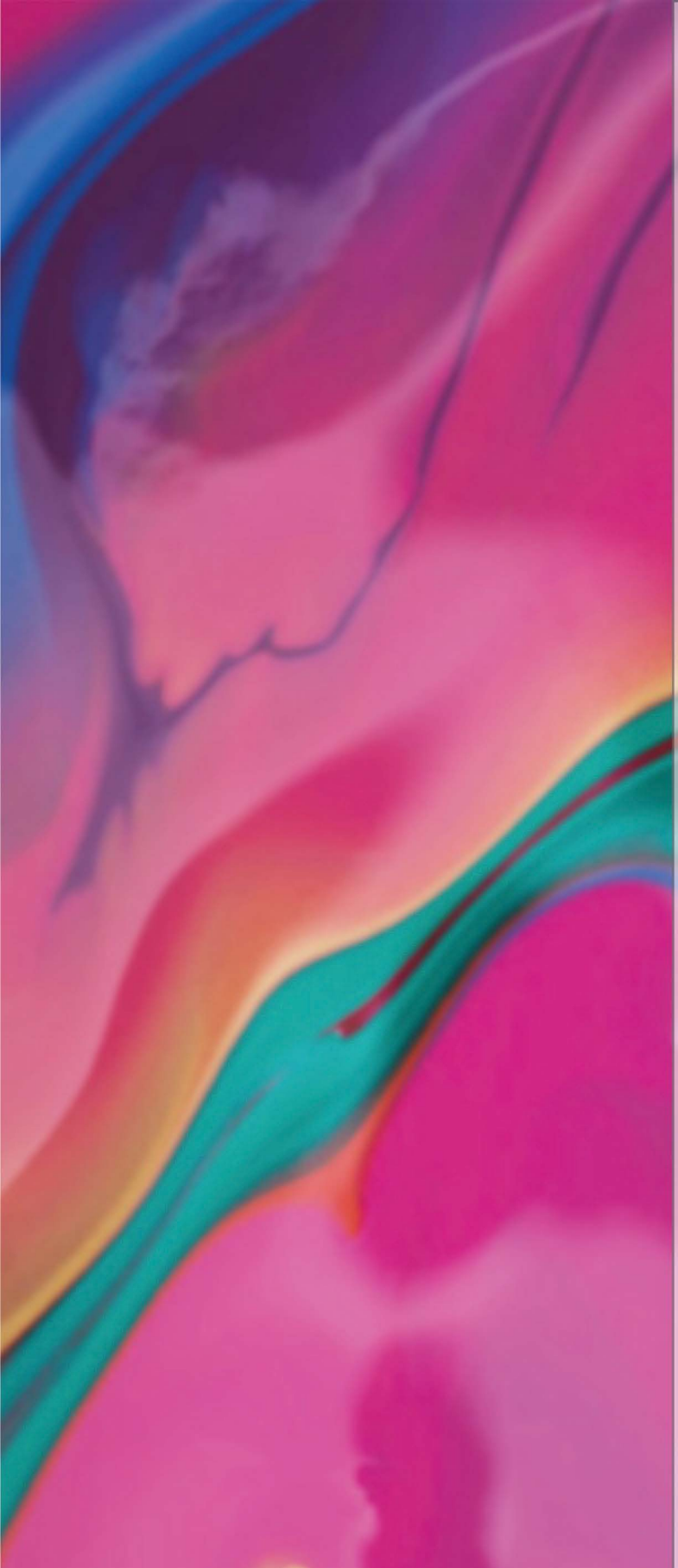

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FAKULTET ZA SPECIJALNU
EDUKACIJU I REHABILITACIJU

UNIVERSITY OF BELGRADE
FACULTY OF SPECIAL EDUCATION
AND REHABILITATION

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11th

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RISK FACTORS FOR THE DEVELOPMENT OF SPECIFIC ARTICULATION DISORDER IN CHILDREN

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Introduction: *Considering inconsistent findings regarding the relationship between various risk factors and speech disorders, this study objective is to analyze following risk factors: long-term use of pacifier, thumb sucking, caretaker speech of parents, and average exposure to electronic media during the day, chronic otitis media, poor differentiation of oral musculature, parental speech status and their association with the occurrence and manifestation of a specific articulation disorder.*

Aim: *The aim of the study was to determine the extent to which various risk factors are present in children who have a specific articulation disorder.*

Method: *The sample consisted of a total of 100 subjects, aged five to seven, who were divided into two groups, experimental (50 subjects with specific articulation disorder) and control (50 subjects without the disorder). The diagnosis of specific articulation disorder was made on the basis of a qualitative analysis of responses to tests of speech and language abilities, anamnestic data and additional examinations. The parents of all respondents completed a socio-demographic questionnaire that included questions about the factors listed as risky for this disorder.*

Results: *The use of pacifiers, thumb sucking and poor differentiation of oral musculature were shown to be significant predictors of specific articulation disorder. On the other hand, when examining the influence of electronic media exposure during the day and the manifestation of dyslalia in children and the influence of chronic otitis media on the manifestation of dyslalia, statistical significance was obtained on the whole sample, but it was not found in a subsample of children diagnosed with specific articulation disorder.*

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Conclusion: *The results support the importance of factors such as the use of pacifier, thumb sucking, and poorly differentiated oral musculatures for the proper development of a child's articulation. Adequate and timely informing parents about possible risk factors for dyslalia could reduce this disorder in children.*

Keywords: *specific articulations disorder, risk factors*

INTRODUCTION

Speech is learned from birth, from the first cry. In order for the development of speech to be correct, certain preconditions must be met: organic, mental and social. Thus, the organic preconditions are formed speech apparatus, good hearing, morphological and functional maturation of the cerebral cortex. Speech development is a process that intertwines with the development of other cognitive ones, such as: thinking, perception, attention, memory, learning, but also emotional stability. The speech pattern that is close to the child, as a social factor, is of an immeasurable importance. Lately, great emphasis has been placed on the role of environment on speech. Thus, the development of speech is impossible without a social speech model that is close to the child, without a speech environment, as well as the overall activity and motivation of the child himself. Today, the prevailing opinion is that the acquisition of the mother tongue, i.e. speech, is a compromise between biological preconditions and environmental factors (Hoff-Ginsberg, 1990). Developmental articulation disorder (specific articulation disorder) is a disorder of voice pronunciation in a child with normal physiological hearing, normal innervation of speech organs, normal intellectual abilities and normal development of other language abilities. According to ICD-10, specific articulation disorder (F80.0) is a specific developmental disorder in which a child uses speech voices less than the appropriate volume for his age, even though the level of speech abilities is normal. Specific articulation disorder refers exclusively to the phonetic aspect of damage, which means that they do not disturb the structure of words.

Articulation disorders can be of different types and degrees of damage. In about 5% of children, articulatory disorders are barely noticeable, so as such they can exist for a lifetime without being a problem. On the other hand, some articulatory disorders can be so conspicuous that verbal communication is completely incomprehensible to the wider social environment (Dobrota, 2010).

Articulation disorders manifest as:

- Omission (lack of some votes),
- Substitution (replacement of an undeveloped voice with a voice that already exists),
- Distortion (damage of certain voices).

According to the data of our authors, the frequency of articulation disorders is around 66.7%, while in preschool children that number is around 38% (Dobrota, 2010).

Research dealing with risk factors for speech and language disorders in children included different populations, had different criteria, different risk factors standards, therefore had contradictory findings (Nelson et al., 2006).

Some of the risk factors for articulation disorders known in the literature are demographic factors (gender, ethnicity, socioeconomic status, parental marital status) and family environment (family history of articulation disorders, birth order, family size, bilingualism, preschool education) (Wren et al., 2016). A very important risk factor is the long-term use of a pacifier or thumb sucking. This can have negative consequences on the development of the speech apparatus, such as protrusion of the maxilla, open bite or cross bite, which will give outbursts on the articulatory plane (Oyamada et al., 2016).

Nelson et al. (2006) take cite gender, family size, but also the education of the parents and the order of the child's birth as risk factors for the development of speech and language disorders. Vladisavljević (1981) states that due to the influence of the family, the child accepts its way of pronunciation. If someone in the family joins, changes voices, etc., the child will learn to speak like that. Caretaker speech affects all voices, and very often the laryngeal voice itself (Golubović, 2012). It is a matter of prolonging the child's way of speaking. This manner of speaking is often maintained for a long period of time.

In recent times, increasing importance has been placed on children's exposure to electronic media, as a significant risk factor for the development of articulatory disorders. The situation is further aggravated if content is displayed in a non-native language. According to the Guide of the American Academy of Pediatrics, only an educational program is recommended for children from two to five years of age, and not more than one hour a day. Further research shows that excessive exposure of children to electronic media leads to poorer performance not only on verbal but also on nonverbal tests, especially when it comes to content in non-native language (Mirella & Schwarz, 2019).

The companion of frequent otitis media is fluctuating hearing loss, and it is the reason for a significant delay in speech-language development (Holm & Kunze, 1969).

RESEARCH PROBLEM

The main problem that this research dealt with was the influence of various factors on the occurrence of specific articulation disorder, as a particularly isolated disorder from the group of specific disorders of speech and language development. In this paper, we will limit to the effect of possible risk factors for the development of specific articulation disorders. These primarily include: long-term use of the pacifier, thumb sucking, caretaker speech of the parents (use baby-talk with the child), and

an average exposure to electronic media during the day, chronic otitis media, poor differentiation of oral muscles, but also the speech status of the parents. The aim of the study was to determine the extent to which various risk factors are present in children who have a developmental disorder in articulation.

The study started from the assumption that children who use a pacifier for a long time (longer than 18 months of age) or suck their thumbs, children whose parents have specific articulation disorder or children whose parents use caretaker speech, children with chronic otitis media or those with poorly differentiated oral musculature will have more frequent manifestations of specific articulation disorder than children who have not used a pacifier for a long time (longer than 18 months), sucked a thumb, do not have poorly differentiated oral muscles, did not have chronic otitis media, whose parents do not have specific articulation disorder or do not use caretaker speech. Also, it is assumed that there is a correlation between the average time the child spends exposed to electronic media during the day and the manifestation of specific articulation disorder in children.

METHOD

The sample consisted of a total of 100 subjects who were divided into two groups, experimental and control. The experimental group consisted of 50 subjects diagnosed with a specific articulation disorder, aged five to seven, who were included in speech therapy treatment at the Health Center in Zvečan. The control group consisted of 50 subjects of typical development, of the same age, who did not show articulation disorders, who came to the Health Center for a regular examination by a pediatrician. The parents of the examined children were also included in the sample. The age of the children ranged from 5 to 7 years. An overview of the sample structure is given in Table 1.

Table 1
Display of sample structure

Whether specific articulation disorder is present				Age			Total
				5	6	7	
No specific articulation disorder	Gender	Male	N	4	14	1	19
			Percentage	8%	28%	2%	38%
		Female	N	11	20	0	31
			Percentage	22%	40%	0%	62%
			N	15	34	1	50
			Percentage	30%	68%	2%	100%
Has specific articulation disorder	Gender	Male	N	11	24		35
			Percentage	22%	48%		70%
		Female	N	3	12		15
			Percentage	6%	24%		30%
			N	14	36		50
			Percentage	28%	72%		100%
	Total		N	29	70	1	100
			Percentage	29%	70%	1%	100%

Examination of the medical records revealed that the subjects included in the sample did not have hearing impairment, neurological disorders and intellectual disabilities as a possible cause of articulation disorders. Then, the examination was approached with appropriate tests, and the parents filled in the constructed questionnaire.

The Global Articulation Test (Kostić & Vladisavljević, 1983) was used to diagnose a specific articulation disorder. After the Global Articulation Test, parents completed a questionnaire specifically designed for this study, related to risk factors (long-term use of pacifier, thumb sucking, caretaker speech of parents, an average exposure to electronic media during the day, chronic otitis media, poor differentiation of oral musculature, parental speech status). To examine the differentiation of oral musculature, the Oral Musculature Test was used (Stevanković et al., 1993). The same test as for children, the Global Articulation Test (Kostić & Vladisavljević, 1983), was used to examine the speech status of parents.

RESULTS

Table 2
Presentation of descriptive data of research variables

		N		Percentage	
		Specific articulation disorder	No specific articulation disorder	Specific articulation disorder	No specific articulation disorder
Usage of a pacifier for more than 18 months	YES	11	24	22%	48%
	NO	39	26	78%	52%
Thumb sucking	YES	1	12	2%	24%
	NO	49	38	98%	76%
Use of a caretaker speech by parents	YES	8	18	16%	36%
	NO	42	32	84%	64%
Chronic otitis media	YES	0	7	0%	14%
	NO	50	43	100%	86%
Poor differentiation of oral musculature	YES	2	37	4%	74%
	NO	48	13	96%	26%
Presence of specific articulation disorder in parents	YES	5	11	10%	22%
	NO	45	39	90%	78%

Table 2 shows the numerical and percentage distribution. By categories of research variable, the use of a pacifier longer than 18 months, thumb sucking, use of caretaker speech by parents, chronic otitis media, poor differentiation of oral muscles, presence of specific articulation disorder in parents, and in children of control group (no specific articulation disorder present) and in children of the experimental group (specific articulation disorder is present). Comparing the numerical values, it can be noticed that the children of the experimental group [24 (48%)] used the pacifier more than 18 months, more than the children of the control group [11 (22%)], but also that they sucked their thumb longer [12 (24%)], in relation to the children of the control group [1 (2%)]. Also, to the children of the

experimental group were spoken more caretaker speech, more than the children of the control group [experimental 18 (36%), control 8 (16%)]. It can be noticed that the children of the experimental group had poorer differentiation of oral musculature than the children from the control group [experimental 37 (74%), control 2 (4%)], as well as the higher presence of specific articulation disorder in the parents of children in the experimental group [11 (22 %)], than in the parents of children in the control group [5 (10%)].

Table 3

Presentation of descriptive data of research variables (number of incorrectly pronounced voices and child's exposure to electronic media)

	Minimum		Maximum		AM		SD	
	No specific articulation disorder	Specific articulation disorder	No specific articulation disorder	Specific articulation disorder	No specific articulation disorder	Specific articulation disorder	No specific articulation disorder	Specific articulation disorder
Number of incorrectly pronounced voices	0	1	0	9	.00	5.36	.00	2.46
Exposure to electronic media in minutes	30	30	120	180	71.40	94.80	27.03	32.28

AM – arithmetic mean; SD – standard deviation

The data in Table 3 show that children diagnosed with a specific articulation disorder incorrectly pronounce at least 1 and at most 9 voices. The average score of incorrectly pronounced voices in the experimental group is 5.36. The minimum time spent with electronic media, both in the children of the control and in the children of the experimental group, is half an hour, i.e. 30 minutes. The maximum period that the children of the control group spend with electronic media is two hours, i.e. 120 minutes, while the children of the experimental group stay with electronic media for up to 3 hours, i.e. 180 minutes. The average time spent with electronic media is 71.40 minutes for children in the control group, and 94.80 minutes for children in experimental group.

Table 4 shows a statistically significant difference, in the whole sample, in the number of incorrectly pronounced voices between those children who used the pacifier for more than 18 months and those who did not [$t(98)=5.44$; $p<.01$], but also between those children who sucked a thumb and those who did not [$t(98)=4.60$; $p<.01$]. Those children who used the pacifier for more than 18 months, that is, those children who sucked their thumb, on average, more often show specific articulation disorder and have a higher number of incorrectly pronounced voices, than children who did not use the pacifier for more than 18 months or sucked thumb. Also, a statistically significant difference is, when we look at the whole sample, in the number of incorrectly pronounced voices was obtained between those children who had chronic otitis media and those who did not [$t(98)=2.02$; $p<.05$], i.e., those children who had chronic otitis media, on average, have more incorrectly pronounced voices than those children who did not have chronic otitis media. A similar picture can be seen when we talk about poor differentiation of oral musculature, i.e., the results

show that children who have poor differentiation of oral musculature, on average, have a higher number of incorrectly pronounced voices than those children who have good differentiation of oral musculature [t(98)=12.14; p<.01].

Table 4

Representation of the differences in the number of incorrectly pronounced voices in relation to the research variables

		The whole sample					
Variables		AM	SD	t	df	p	
Usage of a pacifier for more than 18 months	YES	4.77	3.66	5.44	98	.00	
	NO	1.55	2.25				
Thumb sucking	YES	6.15	2.97	4.60	98	.00	
	NO	2.16	2.91				
Use of a caretaker speech by parents	YES	3.54	3.11	1.60	98	.11	
	NO	2.38	3.20				
Chronic otitis media	YES	5.00	1.92	2.02	98	2.50	.05
	NO	2.51	3.22				
Poor differentiation of oral musculature	YES	5.77	2.61	12.14	98	5.07	.00
	NO	0.70	1.56				
Presence of specific articulation disorder in parents	YES	2.94	2.91	.35	98	.31	.73
	NO	2.63	3.27				

AM – arithmetic mean; SD – standard deviation; t statistics – coefficient of calculated difference; p – statistical significance; df – degrees of freedom

Table 4 shows that a statistically significant difference, in the whole sample, in the number of incorrectly pronounced voices was not obtained between those children who are addressed by their parents by caretaker speech and those who are not [t(98)=1.60; p>.05], but it was not obtained between those children whose parents have specific articulation disorder and those whose parents do not [t(98)=.35; p>.05].

Table 5

Demonstration of the connection between the number of incorrectly pronounced voices and the child's exposure to electronic media

		Exposure to electronic media in minutes
		The whole sample
Number of incorrectly pronounced voices	Pearson correlation coefficient	.39**
	p	.00

p – statistical significance; ** p<.01

The statistical significance of the Pearson correlation coefficient in Table 5 shows that there is a statistically significant correlation between the length of exposure to electronic media and the number of incorrectly pronounced voices, and it is positive and of medium intensity (r=.39; p<.01). Therefore, the number of incorrectly pronounced voices, of children on the examined sample is higher, if those children have a habit of spending a long time with electronic media.

Table 6

Presentation of the difference in the number of incorrectly pronounced voices in relation to the research variables – on a subsample of the experimental group

		Experimental group				
Variables		AM	SD	t	df	p
Usage of a pacifier for more than 18 months	YES	6.96	1.99	5.61	48	.00
	NO	3.88	1.88			
Thumb sucking	YES	6.67	2.43	2.19	48	.04
	NO	4.95	2.36			
Poor differentiation of oral musculature	YES	6.08	2.29	3.99	48	.00
	NO	3.31	1.70			

AM – arithmetic mean; SD – standard deviation; t statistics – coefficient of calculated difference; p – statistical significance; df – degrees of freedom

Further analysis on a subsample of the experimental group showed that there is a statistically significant difference in the number of incorrectly pronounced voices which was obtained between those children who used the pacifier for more than 18 months and those who did not [t(48)=5.61; p<.01], which the data in Table 6 show. Those children who used the pacifier for more than 18 months, on average, have a higher number of incorrectly pronounced voices than children who did not use the pacifier for more than 18 months. The analysis showed statistical significance when it comes to thumb sucking [t(48)=2.19; p<.05] and differentiation of oral musculature [t(48)=3.99; p<.01], i.e., children who sucked thumb have a higher number of incorrectly pronounced voices, from children who did not suck thumb, as well as children who have poor differentiation of oral musculature, on average, have more incorrectly pronounced voices, than children who have good differentiation of oral musculature.

DISCUSSION

Based on theoretical assumptions, that speech development is impossible without a social speech model close to the child, without a speech environment, as well as the overall activity and motivation of the child, that the acquisition of mother tongue, i.e. speech, is a compromise between biological preconditions and environmental factors (Hoff-Ginsberg, 2006) and on the basis of various conducted research (Council on communications and media, 2016; Golubović, 2012; Holm & Kunze, 1969; Nelson et al., 2006; Oyamada et al., 2016; Vladisavljević, 1981; Wren et al., 2016) the main research problem was formed, which would examine the influence of various factors on the occurrence of specific articulation disorder, as a separate disorder from the group of specific disorders of speech and language development.

Analysis of data on the examination of environmental factors on the occurrence of specific disorders of speech and language development, on a sample of children aged 5 to 7, both sexes, equalized according to diagnostic criteria has showed that more children diagnosed with specific articulation disorder had a history of pacifier use longer than 18 months from those children who have not been diagnosed with a specific articulation disorder. Also, a statistically significant difference between children diagnosed with specific articulation disorder and those in whom specific

articulation disorder was not diagnosed was obtained on the whole sample and on the subsample of children in the experimental group. The data obtained in this way are in line with previously conducted research on the impact of long-term pacifier use on speech development (Oyamada et al., 2016). Certainly, a statistically significant difference between children who sucked their thumb and those who did not was obtained on both, the whole sample and the subsample of children diagnosed with a specific articulation disorder.

No statistically significant differences were found in the examination of the influence of caretaker speech by parents and the influence of the presence of specific articulation disorder in parents on the manifestation of specific articulation disorder. On the other hand, examining the influence of electronic media exposure during the day and the manifestation of specific articulation disorder in children and the influence of chronic otitis media on the manifestation of specific articulation disorder, statistical significance was obtained on the whole sample, but it is not found in a subsample of children diagnosed with specific speech disorder.

Confirmation that children with poor differentiation of oral musculature, on average, pronounce voices more incorrectly than those with good differentiation of oral musculature, is double fold here, because a statistically significant difference was noted, and the numerical presentation shows that a higher percentage of children from experimental groups have poor differentiation of oral musculature.

What is the main drawback of this research is the small sample? It is possible that some of the research hypotheses were not confirmed due to the insufficient number of respondents. Also, the sample in this research was appropriate and included only children who applied for a speech therapy examination. It is recommended to conduct this type of research among children whose parents did not turn to experts for help, because there is a possibility that they did not even notice that the child has a disorder, and this behavior of parents can be a special risk factor in this disorder. It is important to note that the severity of specific articulation disorder in this study was considered only through the number of incorrectly pronounced voices, while the type of articulation disorder was not taken into account. The number of spoken voices is not a sufficient predictor of specific articulation disorder, so it is recommended that in future research the severity of this disorder be seen through a wider range of manifestations (type of disorder, groups of voices affected by the disorder, etc.). When it comes to the influence of electronic media, it would be necessary in the next research to look in more detail at the contents of children with specific articulation disorder.

CONCLUSION

As a general conclusion of the research, it can be reported that the main goal of the research process has been achieved here. Factors such as pacifier use, thumb sucking, and the existence of poorly differentiated oral musculatures "support" the development of differential diagnostic symptoms of articulation disorders. Partially obtained differences in the whole sample by gender, time spent with electronic

media and the existence of chronic otitis media, open space for the effect of these variables to be examined on another larger sample, including a larger age range. Children diagnosed with specific articulation disorder had a history of pacifier use longer than 18 months from those children who have not been diagnosed with a specific articulation disorder. Also, the research questions of some future research may go in the direction of examining the influence of poorly differentiated oral musculature, as a consequence of long-term pacifier use and thumb sucking and the combined effect of these three factors on clear articulation of voices.

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