

Original article

Pre-skills of reading and writing in children with developmental language disorder and children with typical language development

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Summary

Introduction. In addition to the development of spoken language, typical intellectual abilities, preservation of the senses of hearing and sight, phonological awareness and the ability of graphomotor expression are necessary for mastering the skills of reading and writing. With this in mind, the aim of this research is to determine the level of phonological awareness and the ability of graphomotor expression in children with developmental language disorder (DLD) and children with typical language development (TLD).

Methods. The sample consisted of 46 children aged five to seven years, who were divided into two groups based on the status of speech and language abilities. The first group consisted of 23 children with DLD, and the second of 23 children with TLD. The FONT test was used to assess phonological awareness, and the Prediction Test for Dysgraphia was used to assess graphomotor abilities.

Results. The results of the research show that children with DLD performed poorly on phonological awareness tasks compared to TLD children. Age proved to be a significant factor in differences in the development of phonological awareness. Achievements on the Prediction Test for Dysgraphia show that children with DLD have almost twice the weaker ability of graphomotor expression compared to TLD children. Furthermore, the research results show that there are significant differences in the level of development of graphomotor skills between children of different ages. Also, no significant difference in achievements on the Prediction Test for Dysgraphia or on the FONT test has been found in relation to gender.

Conclusion. Children with developmental language disorder had significantly lower achievements on the phonological awareness test and the Prediction Test for Dysgraphia compared to children with typical language development.

Key words: gross motor ability, phonological awareness, developmental language disorder, typical language development, pre-skills of reading and writing

Introduction

In today's society, most people are exposed to a large amount of written material on a daily basis. From school age onwards, writing and reading accompany almost every human activity. Therefore, it can be said that the life of a modern man is unimaginable without the ability to read and write, and people with a disorder of these skills can be very limited in everyday life [1].

The basic prerequisites for the development of reading and writing are proper speech and language development, the development of phonological awareness, the ability of visual perception and graphomotor expression. Phonological awareness involves the identification and manipulation of sublexical elements within words, such as syllables and phonemes. It makes it possible to divide spoken words into smaller components [2]. More precisely, phonological awareness represents an explicit awareness of the phonological structure of a language, that is, of recognizing the letter-sound connection. Phonological awareness includes a number of functions that contribute to the understanding and precise automated application of the phonetic system of the language. These are auditory perception, auditory discrimination, auditory analysis, auditory synthesis, auditory combining, auditory memory, correct and continuous auditory classification, auditory form or auditory word recognition, rhyme formation, alliteration and intonation or accent [3, 4, 5].

Phonological awareness develops gradually, from simpler to more complex skills. At an early age, children's phonological representations consist of whole words, while during the preschool period they are reorganized into smaller segments, syllables and phonemes. Also, during phonological development, children master words that rhyme. Awareness of syllables is usually present around the third year of a child's life, while recognition of rhyme develops from the fourth to the fifth year [6]. The development of phonological awareness has been shown to be an indicator of later acquisition of reading, which led to the phonemic deficit hypothesis according to which children with poor phonological awareness have weaker reading abilities and vice versa. Research shows that a large number of children with speech-language disorders and phonological deficits during schooling have learning disabilities, especially disabilities in reading and writing

[5]. In the sequence of phonological deficits, there is a mismatch between lexical units and the corresponding phonological representations. As a result, children can read word "submarine" either "subarin" or "marin" [2].

In children with difficulties in storing and manipulating phonological representations of lexical units, phonological awareness develops slowly. In order for phonological processing to be successful, three prerequisites are needed: developed phonological awareness of the sound structure of the language, the ability to recall phonological information from long-term memory, and developed phonological coding of information in working memory [2].

The development of graphomotor abilities begins in early childhood with the development of gross motor skills, and later with the development of fine motor skills. Before writing training, the child is involved in the process of artistic expression, which is conditioned by the level of hand motor development and the ability to manipulate a pencil. Graphomotor abilities develop gradually, with each stage of development arising as a result of the development of new internal and external factors [7]. At the age of two, children express themselves by drawing lines on paper - scribbling, while at the age of three they are able to form a circle, and later a square and a triangle. The first drawing of a human figure appears in the form of a tadpole, and before starting school a recognizable drawing appears. Most four-year-old children are able to copy a diagonal line and even a few letters, while most preschoolers know how to write their first and last name [7, 8].

Intensive scribbling, drawing and coloring in pre-school age create a foundation and facilitates children's transition to more precise graphomotor expression - complex psychophysiological mechanism. Graphomotor skills are related to visual perception, orientation in space, fine motor coordination, speech development, etc.

Identifying the abilities that underlie reading and writing, as well as finding the most adequate instruments for assessing a child's readiness to master these skills are the subjects of many modern researches. The increasing occurrence of learning disabilities, especially in the area of reading and writing, has led many experts to focus on researching linguistic abilities related to reading and writing. The results of the research show that many children with a disorder in the development of language during their schooling exhibit learning disabilities, especially in reading and writing [4]. Based on that, the aim of this research is to determine the phonological awareness and ability of graphomotor expression in children with the developmental language disorder compared to children with typical language development.

Method

A total of 46 subjects, divided into two groups, took part in the research. The first group consisted of 23 children with developmental language disorder (DLD) representing the experimental group, while the control group consisted of 23 children with typical language development (TLD). Table 1 shows the general characteristics of the sample.

Table 1 shows that there were more girls than boys in the sample in both groups. The sample includes children aged five to seven years. The groups differed statistically significantly in relation to age.

Since deficits in learning to read and write are observed in children with the language development disorder, the subject of this paper was the examination of the pre-skills of reading and writing in children with DLD and children with TLD. More precisely, phonological awareness and graphomotor ability (redrawing given graphic shapes) were examined in children aged five to seven years.

The aim of the paper is to determine the level of phonological awareness and the ability of

graphomotor expression in children with DLD compared to children with TLD.

Table 1. Distribution of respondents according to age and gender

	N	children with DLD		children with TLD	
		%	N	%	N
gender	male	6	39.1	6	26.1
	female	9	60.9	17	73.9
age	5	5	21.7	2	8.7
	6	11	47.8	12	52.2
	7	7	30.4	9	39.1

N - number of respondents

The following were used in the research: Phonological Awareness Test and Prediction Test for Dysgraphia.

1. Phonological Awareness Test - Font [9]

This test was used to assess phonological awareness. A revised version of the test was used for the Serbian-speaking area, which includes eight tests each: 1) joining syllables, 2) syllable segmentation (optional subtest), 3) initial phoneme identification, 4) rhyme recognition, 5) phonemic segmentation, 6) identification of the final phoneme, 7) elimination of the initial phoneme and 8) phonemic substitution (initial phoneme). Each subtest contains six tasks. Test-z tasks were given orally. The examiner notes the accuracy of the answers, according to the true-false principle. The absence of an answer was treated as an incorrect answer. The maximum achievement on each of the subtests can be six points, while the maximum total score on the FONT test is 48 points. This test has good internal consistency and a Cronbach's alpha coefficient of 0.97, which means that the reliability of the used test is very high.

2. Prediction Test for Dysgraphia [10]

The Prediction Test for Dysgraphia primarily examines graphomotor dexterity and visual perception in children. The child is given a

Table 2. Achievements of respondents on the FONT test

	Descriptive statistics					
	M	SD	Md	IQR	min	max
Predictive test for dysgraphia -total score	10.61	3.91	12.00	4	2	15
Arrangement of syllables	5.33	1.017	6	1	2	6
Syllabic segmentation	4.89	1.30	5	2	1	6
Identifying the initial phoneme	3.72	2.15	4	4	0	6
Recognizing rhyme	4.17	1.84	5	3	0	6
Phonemic segmentation	3.46	2.65	4.50	6	0	6
Identifying the final phoneme	2.35	2.07	2	5	0	6
Elimination of the initial phoneme	2.40	2.53	1.50	5	0	6
Phonemic substitution	2.46	2.45	2.50	5	0	6
FONT - total score	28.76	13.55	28.50	25	7	48
FONT - medium value	3.60	1.69	3.56	3.09	0.88	6

M - mean value; SD - standard deviation; Md - median; IQR - interquartile range; min - the smallest value; max - the highest value;

piece of paper with a rectangle drawn on it. On the outside of the contours, in the upper corner, three geometric shapes are drawn: the circle, the cross and the triangle. The child is given the following order: "Your task is to continue drawing these figures around the rectangle in the same order. Try to make them the same size and shape as the ones that were drawn". The explanation procedure can be repeated and this is recorded in the findings. After the child has finished drawing, the examiner evaluates 5 criteria from 0 to 3: the size of the figure (1), the shape of the figure (2), whether the child follows the order of the figures (3), whether the child draws around the rectangle (4) and whether the drawing is finished (5). The maximum number of points that the examinee can achieve on this test is 15, and based on the results of this test, it is determined whether there is a suspicion of dysgraphia.

Data analysis and processing have been performed using a package intended for statistical data processing for the social sciences (Statistical Package for the Social Sciences - SPSS). Descriptive statistics measures (mean value, standard deviation, frequency, median, interquartile range) have been used to de-

scribe the data. Considering that most of the measures obtained by the tests used in this research deviate from the normal distribution model, non-parametric techniques have been used in the statistical processing of the data to examine the differences between the groups. Mann-Whitney U test, Kruskal-Wallis test and two-factor analysis of variance (ANOVA) have been applied.

Results

The FONT test was used to examine phonological awareness in children with DLD and children with TLD. The results are shown in Table 3.

The results show that children with DLD had significantly lower achievements on the FONT test compared to children with TLD (Table 3). Children from both groups achieved the highest average values on the tasks of combining syllables, segmenting syllables and recognizing rhymes. A statistically significant difference was found between children with DLD and TLD children on all subtests of the FONT test ($p < 0.05$). Children with DLD

Table 3. The difference between children with DLD and TLD children in the development of phonological awareness

FONT test	a group	Descriptive statistics				Mann-Whitney U test		
		M	SD	Md	IQR	U	z	p
Joining syllables	DLD	4.74	1.42	6	3	150	-3.17	0.02
	TLD	5.91	0.29	6	0			
Syllabic segmentation	DLD	4.13	1.42	4	3	97	-3.91	0.001
	TLD	5.65	0.49	6	1			
Identifying the initial phoneme	DLD	2.26	1.98	2	3	60	-4.59	0.001
	TLD	5.17	1.03	6	2			
Recognizing rhyme	DLD	3.26	2.05	3	4	134	-2.96	0.003
	TLD	5.09	1.00	5	1			
Phonemic segmentation	DLD	1.17	1.70	0	2	16	-5.82	0.001
	TLD	5.74	0.75	6	0			
Identifying the final phoneme	DLD	1.22	1.73	0	3	98.5	-3.74	0.01
	TLD	3.48	1.75	3	3			
Elimination of phonemes	DLD	0.57	1.41	0	0	60.5	-4.74	0.001
	TLD	4.22	2.02	5	3			
Phonemic substitution	DLD	0.61	1.50	0	0	49.5	-4.99	0.001
	TLD	4.30	1.74	5	2			
Total score	DLD	17.96	9.28	17	14	26	-5.25	0.001
	TLD	39.57	6.75	41	8			
Total score - mean value	DLD	2.25	1.16	2.13	1.75	26	-5.25	0.001
	TLD	4.95	0.84	5.13	1			

M - mean value; SD- standard deviation; Md - median; IQR - interquartile range; U - Mann Whitney's U score; z - value Z statistic; p - level of significance

had high average achievements on the subtest of syllable joining, but children with TLD were more successful. High achievements were achieved by children with DLD and on the subtest syllabic segmentation, but here as well, children with TLD had a significantly higher number of correct answers. Identifying the initial phoneme was not a problem for the majority of subjects with TLD, while subjects with DLD had a lower number of correct answers on that subtest. On the rhyme recognition subtest, the TLD children had a very high average score, in contrast to the clinical group. Phonemic segmentation was an even more difficult task for children with DLD, while children with TLD had almost all correct answers on this task. Identifying the final

phoneme was problematic for both groups of respondents. However, TLD children were better on this subtest compared to children with DLD. The phoneme elimination task was the most difficult for the subjects with DLD and they had the lowest achievements on that subtest, while the children with TLD most often correctly completed the tasks from that group. On the task of phonemic substitution, children with DLD achieved very low average achievements, while children with TLD also had a large number of correct answers on that task.

We hypothesized that boys and girls would differ in the level of development of phonological awareness and tested this claim using the Mann-Whitney U test. However,

the results of this test showed that there was no statistically significant difference between boys and girls in the level of phonological awareness taking into account the total score ($U = 195.5, z = -0.87, p = 0.20$). In addition to the above, there was no statistically significant difference in the achievements of boys and girls on the subtests of joining syllables ($U = 208, z = -0.74, p = 0.98$), syllabic segmentation ($U = 223.5, z = -0.22, p = 0.59$) and rhyme recognition ($U = 216, z = -0.40, p = 0.87$). Boys and girls from the studied sample did not differ in their achievements on the subtests of initial phoneme identification ($U = 228.5, z = -0.10, p = 0.82$), phonemic segmentation ($U = 184.5, z = -1.20, p = 0.16$), final phoneme identification ($U = 228.5, z = -0.10, p = 0.82$), phoneme elimination ($U = 163, z = -1.72, p = 0.07$) and phonemic substitution ($U = 169.0, z = -1.57, p = 0.17$).

For the more detailed analysis of the data, we separated the sample and separately observed the achievements of children from the sub-sample with DLD, and then the achievements from the sub-sample of TLD children. No statistically significant differences were found between boys and girls in the group of children with DLD in the level of development of phonological awareness ($U = 53, z = -0.60, p = 0.48$), achievements on the subtests syllable joining ($U = 49, z = -0.96, p = 0.69$), syllable segmentation ($U = 60, z = -0.20, p = 0.46$), initial phoneme identification ($U = 48, z = -0.97, p = 0.63$), rhyme recognition ($U = 51, z = -0.78, p = 0.50$), phonemic segmentation ($U = 54, z = -0.63, p = 0.69$), final phoneme identification ($U = 59, z = -0.28, p = 0.71$), phoneme elimination ($U = 63, z = 0.00, p = 0.40$) and phoneme substitution ($U = 55, z = -0.76, p = 0.36$).

In the group of TLD children, statistically significant differences were found between boys and girls in the level of development of phonological awareness ($U = 46.5, z = -0.32, p = 0.76$), in achievements on the subtests syllable joining ($U = 45, z = -0.86, p = 0.39$), syllable segmentation ($U = 50, z = -0.09, p = 0.93$), initial phoneme identification ($U = 47, z = -0.31, p$

$= 0.76$), rhyme recognition ($U = 35.5, z = -1.17, p = 0.24$), phonemic segmentation ($U = 48.5, z = -0.30, p = 0.77$), final phoneme identification ($U = 40, z = -0.79, p = 0.43$), phoneme elimination ($U = 29.5, z = -1.55, p = 0.12$) and phoneme substitution ($U = 40, z = -0.79, p = 0.43$).

We assumed that older children had a higher level of phonological awareness than younger children. Given that we had three age groups of children, we used the Kruskal-Wallis test to examine differences in the level of development of phonological awareness in children of different ages. First, we showed age differences in phonological awareness by observing the total sample, and then we examined the interaction of language disorder and age on children's achievements on the FONT test.

Table 4 shows the difference in phonological awareness among children of different ages from the total sample, and there we see that the highest average achievements on the FONT test were achieved by children aged 7, slightly lower by children aged 6, while the youngest children had the lowest achievements on this test and this difference is statistically significant ($\chi^2(2, n = 46) = 7.58, p = 0.02$). Looking at each of the subtests separately, we see that the statistically significant difference between respondents of different ages was found on the subtests identifying the initial phoneme and identifying the final phoneme. The youngest subjects had little success in the task of identifying the initial phoneme. Respondents aged six years had lower average achievements on the task of identifying the initial phoneme compared to the oldest respondents. The youngest respondents managed to identify the final phoneme in a small number of tasks of this subtest, although children aged six had very little success, while the oldest respondents had the most correct answers. The Kruskal-Wallis test did not reveal any statistically significant difference between subjects of different ages in the achievements on the subtests of syllable joining, syllabic segmentation, rhyme recognition, phonemic segmentation, phonemic

Table 4. Phonological awareness in children of different ages - total sample (N = 46)

FONT test	age	Descriptive statistics					Kruskal-Wallis test		
		N	M	SD	Md	IQR	χ^2	df	p
Joining syllables	5	7	4.43	1.62	4	3	5.15	2	0.08
	6	23	5.35	1.11	6	1			
	7	16	5.69	0.87	6	0			
Syllabic segmentation	5	7	4	1.29	4	2	4.96	2	0.08
	6	23	5.04	1.02	5	2			
	7	16	5.06	1.57	6	2			
Identifying the initial phoneme	5	7	1.43	2.44	0	2	10.48	2	0.01*
	6	23	3.70	1.79	4	2			
	7	16	4.75	1.77	6	3			
Recognizing rhyme	5	7	2.71	2.14	2	4	5.51	2	0.06
	6	23	4.17	1.78	5	3			
	7	16	4.81	1.33	5	3			
Phonemic segmentation	5	7	2	2.83	0	6	2.28	2	0.24
	6	23	3.48	2.62	3	6			
	7	16	4.06	2.43	6	4			
Identifying the final phoneme	5	7	0.57	0.97	0	2	9.21	2	0.01*
	6	23	2.13	1.52	2	2			
	7	16	3.44	2.48	4	6			
Elimination of the initial phoneme	5	7	1.57	2.70	0	5	2.86	2	0.24
	6	23	2.04	2.25	1	4			
	7	16	3.25	2.75	4	6			
Phonemic substitution	5	7	1.57	2.69	0	5	4.52	2	0.11
	6	23	2.04	2.00	2	4			
	7	16	3.44	2.80	5	6			
Total score	5	7	18.29	15.66	10	32	7.58	2	0.02*
	6	23	27.96	11.28	27	15			
	7	16	34.50	13.38	41	26			
Total score - arithmetic mean	5	7	2.29	1.96	1.25	4	7.58	2	0.02*
	6	23	3.49	1.42	3.37	1.88			
	7	16	4.31	1.67	5.10	3.25			

N - number of respondents; M - mean value; SD - standard deviation; Md - median; IQR - interquartile range; χ^2 - Kruskal Wallis chi square statistic; df - number of degrees of freedom; p - level of significance

substitution and initial phoneme elimination ($p > 0.05$).

The results of the two-factor analysis of variance, which examined the influence of the interaction of language abilities and age on the development of phonological awareness

found that there was no statistically significant interaction between language abilities and the age of the examinee on the level of phonological awareness tested by the FONT test ($p > 0.05$). The results of the two-factor analysis of variance show that the effects of

the factors age and language disorder are in the statistically significant interaction in their effect on the dependent variable - phonemic substitution ($F = 3.68$, $df1 = 2$, $df2 = 40$, $p = 0.04$). Subsequent comparisons using Tukey's HSD test show that children's achievements on the syllabic segmentation subtest do not differ significantly between groups of children of different ages ($p > 0.05$).

The graphomotor abilities of children were examined with the prediction test for dysgraphia. The achievements of children with DLD and children with TLD were compared. The results of the Mann-Whitney U test are shown in table 5. Subjects with DLD had almost twice lower achievements on the Prediction Test for Dysgraphia than children with TLD. Adequate figure size was more common in children with TLD than in children with DLD. Children with TLD also satisfied the criterion of figure shape when drawing to a much greater extent than children with DLD. The order of the three figures was correctly remembered by almost all children with TLD, while in the group with DLD there were children who

made mistakes in the given arrangement of figures when drawing. All TLD children kept the given distance from the edge of the rectangle while drawing figures, while children with DLD were worse in achieving this criterion. Almost all children from DLD completed the drawing to the end, while all children from TLD completed the task to the end.

By comparing the achievements of boys and girls from the examined sample, no statistically significant difference was found on the Prediction Test for Dysgraphia ($U = 213$, $z = -0.46$, $p = 0.65$). Boys and girls did not differ in terms of figure size criteria ($U = 220$, $z = -0.31$, $p = 0.76$), figure shape ($U = 228.5$, $z = -0.11$, $p = 0.92$), following the sequence of figures ($U = 170$, $z = -1.76$, $p = 0.08$), drawing around the rectangle ($U = 229$, $z = -0.10$, $p = 0.92$), finishing drawings ($U = 222$, $z = -0.34$, $p = 0.73$).

Based on the assumption that age influences graphomotor abilities, the achievements of children of different ages on the Prediction Test for Dysgraphia were compared, and the results are shown in table 6. The Kruskal-Wallis test determined a statistically significant difference in the

Table 5. Differences between children with DLD and TLD children in the development of graphomotor abilities

A predictive test for dysgraphia	a group	Descriptive statistics				Mann-Whitney U test		
		M	SD	Md	IQR	U	z	P
Size	DLD	0.52	0.85	0	1	115.0	-3.49	0.001
	TLD	1.74	1.21	2	2			
Shape	DLD	1.43	1.08	1	1	97.0	-4.01	0.001
	TLD	2.70	0.70	3	0			
It follows the order of ed	DLD	1.87	1.22	2	2	130.0	-3.56	0.001
	TLD	2.91	0.28	3	0			
Draws around the rectangle	DLD	1.74	1.14	1	2	103.5	-4.37	0.001
	TLD	3	0	3	0			
Finished drawing	DLD	2.30	0.02	3	1	149.5	-3.51	0.001
	TLD	3	0	3	0			
Total score	DLD	7.87	3.65	9	7	32.0	-5.16	0.001
	TLD	13.35	1.50	13	3			

M - mean value; SD - standard deviation; Md - median; IQR - interquartile range; U - Mann Whitney's U score; z - value Z statistic; p - level of significance

Table 6. Graphomotor skills in children of different ages - total sample (N = 46)

A predictive test for dysgraphia	age	Descriptive statistics					Kruskal-Wallis test		
		N	M	SD	Md	IQR	χ^2	df	P
Size	5	7	0.29	0.49	0	1	3.78	2	0.15
	6	23	1.26	1.21	2	2			
	7	16	1.31	1.30	1	3			
Shape	5	7	1.00	1.15	1	2	10.12	2	0.01*
	6	23	2.00	1.09	2	2			
	7	16	2.63	0.72	3	1			
Follow the order of the figures	5	7	1.43	1.27	1	3	7.28	2	0.03*
	6	23	2.48	0.95	3	1			
	7	16	2.69	0.79	3	0			
Draws around the rectangle	5	7	1.43	1.13	1	2	7.10	2	0.03*
	6	23	2.48	0.95	3	1			
	7	16	2.63	0.89	3	0			
Finished drawing	5	7	1.43	1.39	2	3	13.85	2	0.001
	6	23	2.87	0.34	3	0			
	7	16	2.88	0.34	3	0			
Total score	5	7	5.57	4.47	3	8	8.84	2	0.01*
	6	23	11.09	3.40	12	3			
	7	16	12.13	2.50	12	5			

N - number of respondents; M - mean value; SD- standard deviation; Md - median; IQR - interquartile range; χ^2 - Kraskal Wallis chi square statistic; df - number of degrees of freedom; p - level of significance

level of graphomotor abilities of three different age groups. The youngest age group had lower median score than the other two age groups. To the greatest extent, the oldest subjects drew figures of regular shape, a slightly weaker satisfaction of this criterion was observed in the group of six-year-olds, while the youngest subjects had a lot of difficulty in drawing the given shapes. Five-year-old children did not follow the given sequence of figures when drawing, and errors of this type were also observed in the group of children aged six, while children aged

seven made the fewest mistakes when drawing given figures. The youngest respondents had difficulty in maintaining the specified distance from the edge of the rectangle when drawing figures, unlike the older children who had a lot of success in meeting this criterion. The group of 7-year-old children was almost completely successful in satisfying the criterion of a completed drawing, while the youngest respondents stopped the task before completing it. The influence of age on drawing the appropriate figure size has not been determined.

Discussion

Research in our speaking area has shown that the development of phonological awareness is an indicator of children's later acquisition of reading, as well as that graphomotor abilities influence the development of children's writing skills [7, 8]. Therefore, the aim of this research is to determine phonological awareness and graphomotor abilities, as pre-skills for reading and writing, in children with developmental language disorder (DLD) and children with typical language development (TLD). The results show that children with DLD have significantly lower achievements on the phonological awareness test compared to children with TLD. Our results are in agreement with the results of other studies which also showed that phonological awareness correlated with children's language abilities [11]. According to the results of our research, joining syllables, syllabic segmentation and rhyme recognition were the easiest results of phonological awareness, both in subjects with DLD and subjects with TLD. This is supported by the high achievements on all tasks, with the fact that the children with TLD were still more successful than the children with DLD. Better development of syllabic segmentation, joining of syllables and recognition of rhyme in relation to the development of other elements of phonological awareness were also shown by the research results of other authors [12]. Data from the literature generally show that children with DLD have particularly poor achievements on more complex phonological awareness tasks [13]. In a recently published study, it was shown that children with DLD had better results on tasks of phonological synthesis compared to analysis, with the fact that children with TLD were significantly more successful in all tasks [11]. According to the results of our research, children with DLD had difficulties in identifying initial and final phonemes, phonemic segmentation, sub-

stitution and elimination. Eliminating the phoneme and identifying the final phoneme were the most difficult tasks for the children from our sample, while in the research of Golubović et al., the most difficult tasks were the elimination of the initial phoneme and the phoneme substitution task [4]. In other studies conducted on a larger sample of children with DLD and TLD children, it was determined that children with DLD had a significantly lower level of phonemic awareness compared to children with TLD [11], as well as that children with DLD had significantly lower achievements in rhyme recognition and production tasks, which coincides with the results of this research [14].

According to the results of our research, gender had no influence on phonological awareness in preschool children. The difference was not established even when we looked separately at boys and girls from the group with DLD and the group with TLD. In this sense, our results coincide with the results of the research conducted by Golubović et al., which also showed that gender did not represent a significant success factor in phonological awareness tasks [5].

The results of our study showed that children of the youngest age (5 years old) had very low achievements on phonological awareness tasks compared to children aged six and seven years. Other research has also shown that achievements on the phonemic awareness test depend on age [5, 9]. Our data show that older children were more successful than younger children in tasks of identifying the initial and completed phonemes. In contrast to our results, Golubović et al indicate a trend of increasing average scores on the tasks of phonemic segmentation, identification of the final phoneme, elimination of the initial phoneme and phonemic substitution with the age of the subjects [12]. This difference in results may be the result of the fact that the authors of the mentioned study had school-age subjects in their sample, who had

already been included in intensive reading training. Generally speaking, the differences between the results of our research and some earlier researches on phonological awareness can be attributed to the small sample included in this study and the unequal distribution of respondents in age groups.

Regarding the assessment of graphomotor abilities, children with DLD had as twice as poor achievements on the Prediction Test for Dysgraphia compared to children with TLD. This finding indicates the possible presence of deficits in fine motor skills in children with DLD, which were otherwise established in earlier research on the relationship between language and motor skills in children with DLD [15]. Children with DLD more often drew figures of inadequate size and shape, made more mistakes in the given order of figures and showed difficulties in keeping the given distance from the edge of the rectangle while drawing and difficulties in completing the task to the end. According to the high average scores that the children from both groups achieved on this criterion, it can be said that most of the children were persistent and finished the drawing. The results of earlier research on graphomotor skills in preschool children were quite variable. For example, Nikolić et al. stated that the children in their sample were highly motivated and that they all successfully completed the task, while Čalasan et al. determined that 42.9% of the children included in the sample had difficulty solving the task independently [16, 7].

According to the results of our research, gender did not affect the graphomotor abilities of the children from the examined sample. However, the results of other studies have shown gender differences on the Prediction Test for Dysgraphia. More precisely, boys were found to have a greater presence of elements suspicious of dysgraphia, while girls had difficulty drawing figures of the appropriate size [17].

Our results show that graphomotor skills improve with age. Children of the youngest age had very low achievements on the Prediction Test for Dysgraphia, while graphomotor abilities were significantly better in older children. Similar results were found in earlier researches [18].

Conclusion

Analyzing the obtained results we can conclude that phonological awareness and graphomotor abilities are more developed in children with TLD compared to children with DLD. It was also determined that success on the test of phonological awareness and graphomotor abilities increased with age in both groups of subjects.

Disturbances in reading and writing can occur in children with the developmental language disorder, but also in children with typical language development. Given that the estimated graphomotor abilities and the level of phonological awareness in children have a predictive role in the development of reading and writing, preschool children should be provided with additional support in developing these abilities. Early recognition of deficits in terms of phonological awareness and the development of graphomotor skills aim to prevent reading and writing disorders. This support is needed by children with language disorders, as well as children with typical language development.

A limitation of this study is the relatively small sample size, so future research should include a larger number of respondents. Another limitation of the study is reflected in the finding of research that used the same tests and a sample of similar characteristics exclusively from the Serbian speaking area, so there is no comparison of the results with research from other speaking areas.

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and informed consent was obtained from all individual respondents. The research was conducted according to the Declaration of Helsinki.

Conflicts of interest. The authors declare no conflict of interest.

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Predvještine čitanja i pisanja kod djece sa razvojnim jezičkim poremećajem i djece tipičnog jezičkog razvoja

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Uvod. Pored razvijenosti govornog jezika, tipičnih intelektualnih sposobnosti, očuvanosti čula sluha i vida, za savladavanje vještina čitanja i pisanja neophodne su fonološka svjesnost i sposobnost grafomotornog izražavanja. S obzirom na to, cilj ovog istraživanja je utvrđivanje nivoa fonološke svijesti i sposobnosti grafomotornog izražavanja kod djece sa razvojnim jezičkim poremećajem (RJP) i djece tipičnog jezičkog razvoja (TJR).

Metode. Uzorak je činilo 46 djece uzrasta od 5 do 7 godina, koja su na osnovu statusa govorno-jezičkih sposobnosti podijeljena u dvije grupe. Prvu grupu činilo je 23 djece sa RJP, a drugu 23 djece TJR. Za procjenu fonološke svjesnosti korišćen je FONT test, a za procjenu grafomotornih sposobnosti Predikcioni test za disgrafiju.

Rezultati. Rezultati istraživanja su pokazali da su djeca sa RJP bila lošija na zadacima fonološke svjesnosti u poređenju sa djecom TJR. Uzrast se pokazao kao značajan faktor razlika u razvijenosti fonološke svjesnosti. Postignuća na Predikcionom testu za disgrafiju pokazuju da djeca sa RJP imaju skoro dvostruko slabiju sposobnost grafomotornog izražavanja u poređenju sa djecom TJR. Nadalje, rezultati istraživanja su pokazali da postoje značajne razlike u nivou razvijenosti grafomotornih sposobnosti između djece različitog uzrasta. Takođe, nije utvrđena značajna razlika u postignućima na Predikcionom testu za disgrafiju, ni na FONT testu u odnosu na pol.

Zaključak. Djeca sa razvojnim jezičkim poremećajem imala su znatno slabija postignuća na testu fonološke svjesnosti i predikcionom testu za disgrafiju u poređenju s djecom tipičnog jezičkog razvoja.

Ključne riječi: grafomotorna sposobnost, fonološka svjesnost, razvojni jezički poremećaj, tipični jezički razvoj, predvještine čitanja i pisanja