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Early literacy skills in Latvian preschool children with specific language impairment

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Abstract. The present study explores differences in early literacy skills of Latvian preschool children with Specific Language Impairment (SLI) compared to children from general population. The participants were 21 children with diagnosis of Specific developmental disorders of speech and language (F80; ICD-10) and 21 children as matched control group (in each group: mean age=79 months, 88% boys). Both samples were selected from the adaptation and standardization study of Dynamic Indicators of Basic Early Literacy Skills (DIBELS Next) in Latvia (Good & Kaminski et al., 2011; Latvian version, Rascevska et al., 2013a). The results show significant differences between two groups in DIBELS Next composite score ($t=3.09$, $p < .01$), First Sound Fluency ($t = 2.54$, $p < .05$), Phoneme Segmentation Fluency ($t = 2.80$, $p < .01$), Correct Letter Sounds ($t = 3.38$, $p < .01$) and Whole Words Read ($t = 3.39$, $p < .01$) from Nonsense Word Fluency. Phoneme awareness represented by first sound and phoneme segmentation fluency and phonological decoding observed during nonsense word reading was poorer for the SLI group, albeit letter naming did not differ in both groups. No differences in letter naming might be explained due to intensive instruction the children with SLI are receiving in their institution of special education, while children from general population might not have this enhanced support.

Introduction

Reading is a complex skill with several components contributing to a person being a good reader – namely, decoding, word recognition, vocabulary, reading fluency, and comprehension. To be a skillful reader, a person needs to be proficient in all of the component skills contributing to reading. Difficulty with decoding or a deficient vocabulary can interfere with reading fluency, which, in turn, affects reading comprehension – the ultimate goal of all reading (Puranik et al. 2008).

The development of early literacy skills and the risk of reading disorders are widely studied in English language (Catts et al., 2002; Briscoe et al., 2001; Snowling et al., 2000).

At present moment, there are very few researches about development of literacy skills in Latvia. We have to mention the research about early phonological skills as a predictor of reading acquisition (Sprugevica & Hoien, 2003). The purpose of their study was to investigate the power of early measures of phonological skills (phonemic awareness, rapid naming, and short term memory) in predicting later reading skills at various points of time. However, the research of early literacy skills in children with

speech and language impairment hasn't been successful in Latvia because there are no tests and correct standardized procedures specific to Latvian language. In this research, we used DIBELS Next Latvian version (Good & Kaminski et al., 2011; Latvian version, Rascevska et al., 2013a).

Specific Language Impairment (SLI) represents a disorder in the development of oral language (Leonard, 1998). Previous research has shown that children with Specific Language Impairment have difficulty with decoding and word recognition. Very often nonverbal IQ scores for the children with SLI are within normal limits and no hearing or social-emotional deficits are present. The oral language problems observed in SLI include problems in semantics, syntax, and discourse (Paul, 2001; Leitão & Fletcher, 2004). Children with SLI also have problems in phonological processing (Leitão, Hogben, & Fletcher, 1997), including deficits in phonological awareness (Briscoe, Bishop, & Norbury, 2001; Catts, 1993; Nathan et al., 2004; Snowling et al., 2000) and phonological memory (Briscoe et al., 2001; Kamhi & Catts, 1986). In fact, considerable attention has been paid to a link between SLI and deficits in phonological memory. Specifically, Gathercole and Baddeley (1990) observed that children with SLI performed poorly on measures of phonological memory, especially non-word repetition (Gathercole & Baddeley, 1990). In preschoolers expressive vocabulary knowledge is highly correlated with early reading skills such as rhyme awareness, phonemic awareness, and letter knowledge (Mann & Foy, 2003). Children with diagnosed speech and language disorders are more likely than children without these difficulties to have later reading problems (Catts, 1993).

Letter knowledge is tied to reading ability and letter sounds are a set of vocabulary items that a child must master in order to understand how the alphabet works. Assuming the problems which children with SLI appear to have in phonological processing, it would be expected that these children would also have difficulties in word reading. Studies have shown that children with SLI often have problems in learning to recognize printed words (Bishop & Adams, 1990; Catts, 1993; Catts et al., 2002; McArthur et al., 2000; Snowling et al., 2000).

Accurate speech production also is an aspect of expressive vocabulary, another language skill that appears to be related to reading, and may be a critical factor in how well children respond to early reading intervention (Al Otaiba & Torgesen, 2007). Bishop and Adams (1990) showed that children whose speech impairments had resolved by age 5½ years were not at significant risk for later reading problems compared to children whose speech problems persisted by the time they entered school. The phonological processing deficits associated with reading problems include impaired categorization of speech sounds (Serniclaes et al., 2004).

All of these findings suggest that children in kindergarten with SLI may be strong candidates for early reading intervention by underlying phoneme processing problems linked to difficulties learning letters and their associated sounds.

The ability to isolate the first sound in a word is an important phonemic awareness skill that is highly related to reading acquisition and reading achievement (Yopp, 1988). PSF assesses the student's fluency in segmenting a spoken word into its component parts or sound segments.

Fluency in naming letters is a strong and robust predictor of later reading achievement (Adams, 1990). The ability to recognize and name letters in preschool and at the beginning of kindergarten is a strong predictor of later reading achievement (Badian, 1995; Walsh, Price, & Gillingham, 1988).

Phoneme Segmentation Fluency assesses the student's fluency in segmenting a spoken word into its component parts or sound segments. Nonsense Word Fluency assesses knowledge of basic letter-sound correspondences and the ability to blend letter sounds into consonant- vowel-consonant (CVC) and vowel-consonant (VC) words (Edwards, Lahey, 1998). One reason that nonsense word measures are considered to be a good indicator of the alphabetic principle is that "pseudo words have no lexical entry, [and thus] pseudo-word reading provides a relatively pure assessment of students' ability to apply grapheme-phoneme knowledge in decoding" (Rathvon, 2004).

As described before, studies of early literacy skills in English language show differences in phoneme awareness, letter knowledge, word recognition and non-word repetition between children with SLI

and general population. The aim of this study was to find out, if there are any differences in early literacy skills of Latvian preschool children with SLI compared to children from general population. We presumed that similar to English speaking children, Latvian speaking children with SLI would show lower results in early literacy skills compared to control group, but it has to be empirically verified. We also wanted explore, if relationships among components of early literacy skills are similar in both groups.

Methods

Participants

The participants were Latvian speaking preschool children aged 74 to 84 months, including 21 children with diagnosis of Specific developmental disorders of speech and language (F80; ICD-10, WHO, 1992) and 21 children as matched controls from general population (in each group: mean age=79 months, SD=3 month, 88% boys). Both samples were selected from the adaptation and standardization study of DIBELS Next in Latvia. All children had written parent permission for participation in the study.

Measures

Each child was assessed on *Dynamic Indicators of Basic Early Literacy Skills* (DIBELS Next) (Good & Kaminski et al., 2011; adaptation and standardization in Latvia, Rascevska et al., 2013a). We used Benchmark Assessment for kindergarten in the middle of the school year, which includes First Sound Fluency (FSF) and Phoneme Segmentation Fluency (PSF), both assessing phonological awareness, Nonsense Word Fluency (NWF) reflecting phonological decoding and measuring two sub indicators: Correct Letter Sounds (CLS) and Whole Words Read (WWR), and Letter Naming Fluency (LNF). DIBELS Next Composite score was calculated as a sum of FSF, LNF, PSF and NWF (CLS) scores.

The reliability in Latvian adaptation and standardization study is characterized by correlations between repeated measures (period of time between two measures was 2 to 3 month). All correlations between repeated measures were statistically significant. A correlation between beginning and middle period of the school year on LNF in population was $r = .70$, $p < .01$, but in SLI group $r = .77$, $p < .01$; a correlation between beginning and middle period of the school year on LNF in population was $r = .82$, $p < .01$, while in SLI group $r = .92$, $p < .01$; a correlation between middle and end period of the school year on LNF in population was $r = .80$, $p < .01$, and in SLI group $r = .94$, $p < .01$; a correlation between middle and end period of the school year on NWF (CLS) both in population and SLI group was $r = .84$, $p < .01$; a correlation between middle and end period of the school year in NWF (WWR) both in population and SLI group was $r = .68$, $p < .01$ (Rascevska et al., 2013b). The correlations between repeated measures show stability of most of measurements over time $r > .70$, on NWF (WWR) r also almost reaches .70.

Procedure

The assessment of early literacy skills was done in one 15 to 20 minute long individual session with each participant.

Results

The summary of descriptive and inferential statistics on each measurement of early literacy skills for both groups is presented in Table 1. As separate measurements of early literacy skills form one construct, the most appropriate method of data analysis for differences between groups would have been

Table 1. The summary of descriptive and inferential statistics for indicators of early literacy skills of children from general population and children with Specific Language Impairment.

	GP				SLI				F(df1, df2)***	t-test	η^2
	M	SD	Min	Max	M	SD	Min	Max			
DIBELS composite score	176.05	80.77	36	318	105.71	65.93	19	264	1.25(40, 39)	3.09**	.19**
FSF	39.90	12.96	14	60	29.52	13.56	1	60	0.09(40, 40)	2.54**	.14*
LNF	41.71	21.61	4	87	32.00	19.62	5	63	0.02(40, 40)	1.53	.06
PSF	33.76	20.13	7	87	17.29	17.98	0	59	0.65(40, 39)	2.80**	.16**
NWF (CLS)	60.67	39.10	0	139	26.90	23.96	0	103	6.29* (40, 33)	3.38**	.22**
NWF (WWR)	19.00	13.79	0	46	7.52	7.14	0	39	11.70**(40, 30)	3.39**	.22**

Note. ** $p < .01$; * $p < 0.05$; ***Levene's F for variation; FSF – First Sound Fluency; LNF – Letter Naming Fluency; PSF – Phoneme Segmentation Fluency; NWF – Nonsense Word Fluency; CLS – Correct Letter Sounds; WWR – Whole Words Read; GP – general population; SLI – Specific Language Impairment.

Table 2. Pearson correlations of early literacy skill variables in each group separately.

		1	2	3	4
GP	FSF				
	LNF	.81**			
	PSF	.70**	.48*		
	NWF (CLS)	.62**	.84**	.43*	
	NWF (WWR)	.64**	.83**	.45*	.99**
SLI	FSF				
	LNF	.68**			
	PSF	.72**	.55*		
	NWF (CLS)	.67**	.81**	.68**	
	NWF (WWR)	.65**	.77**	.67**	.99**

Note. ** $p < .01$; * $p < 0.05$; FSF – First Sound Fluency; LNF – Letter Naming Fluency; PSF – Phoneme Segmentation Fluency; NWF – Nonsense Word Fluency; CLS – Correct Letter Sounds; WWR – Whole Words Read; GP – general population; SLI – Specific Language Impairment.

MANOVA. In our case, because of too strong correlations (mostly $r > .60$) between separate indicators of early literacy skills (see Table 2), instead of MANOVA we had to conduct independent sample t-test for each separate measurement.

Levene's test indicated no significant differences between variances of two groups in most of the variables (see Table 1). The only statistically significant differences between variances of the groups were reported on CLS and WWR from NWF task. In CLS, the SLI group and control group have equal minimal score, but SLI group has considerably lower maximal score. The same is observed for minimal and maximal scores in WWR. The independent sample t-test shows statistically significant differences between groups (see Table 1) on DIBELS Next Composite score, FSF, PSF, CLS and WWR from NWF, while no significant differences between groups were reported on LNF. Children with SLI show lower results than children from control group in all indicators. Eta squared suggest that 19% DIBELS Next composite score, 14% of the results in FSF, 16% of results obtained in PSF, 22% of results in both – CLS and WWR from NWF are significantly explained by IVa (see Table 1).

Pearson correlations among early literacy skill components were conducted separately for each group. In both groups all correlations among measurements are statistically significant (see Table 2). Correlation coefficients vary in the range from .43 to .99, $p < .05$ in general population and in the range from .55 to .99, $p < .05$ in the SLI group.

The comparison of correlation coefficients in two samples converting them to z values and testing H_o: $\rho_{x1y1} = \rho_{x2y2}$ shows that z values vary in the range from -0.65 to 0.93, $p > .05$. There are no

significant differences between correlation coefficients of SLI and control group in components of early literacy skills.

Discussion

Our data confirm that Latvian children with SLI have significantly lower results in composite score representing early literacy skills and in four separate indicators out of five. As presumed phoneme awareness represented by first sound fluency, phoneme segmentation fluency and phonological decoding observed during nonsense word reading was poorer for the SLI group, but, unexpectedly, letter naming did not differ in both groups. The findings are supported by the previous studies in English population, were children with SLI show poor skills of phonological awareness (Snowling et al., 2000; Nathan et al., 2004), and problems in nonsense word repetition which in general can be related to phonemic decoding (Gathercole & Baddeley, 1990; Rathvon, 2004). No differences in the letter naming might be explained in the way that preschool children with SLI in Latvia are receiving intensive instruction in this basic skill area and thus, probably, have automatized letter naming skill as good as their peers from general population. Another explanation of such results might be connected to difference in instruction the children in both groups are receiving in their preschool education institutions. For example, a part from children might be familiar only with capitals and not with written letters, because they have not been taught to recognize written letters yet.

In addition, we discovered that for Latvian children with SLI and children from general population the same mechanisms are involved among components of early literacy skills. However, in our study correlations among DIBELS Next components are stronger than the original study of English children population (Burke et al., 2009).

Limitations of current study include several aspects. Due to gender disproportion in the SLI group, we were limited in options to double matched control group. The control group are random children from general population and there is no guarantee that they do not have SLI or other unidentified disorders, as well as there might be other mixed variables we did not control for, for example, SES, IQ, a type of instruction the children are receiving. The SLI group consisted of children with speech and/or language disorder and it was not specified which one of the disorder the child has. Thus, in future research it is suggested to distinguish speech disorder group, language disorder group and mixed disorder group. It is also recommended to control for SES which is highly related to language development and acquisition of literacy.

Conclusion

The present study reports that Latvian preschool children with SLI differ from their peers from general population, showing poorer phonological awareness and phonemic decoding skills, but they are almost as good as children from the control group naming letters. The children with SLI, probably, are receiving intensive instruction in letter naming, and thus have automatized this particular skill much better than other early literacy skills.

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