CHILDREN'S LANGUAGE STATUS, NOT LANGUAGE, PREDICTS VOCABULARY SIZE: A CROSS-LINGUISTIC STUDY OF CROATIAN AND SLOVENIAN CHILDREN USING THE CDI-III

JELENA KUVAČ KRALJEVIĆ[1], LIDIJA ŠMIT BRLEKOVIĆ[,2], BARBARA PENKO[3], DAMJANA KOGOVŠEK[3]

[1]Department of Speech and Language Pathology, Faculty of Education and Rehabilitation Sciences, University of Zagreb, Croatia

[2]Postgraduate Doctoral Programme Speech, Language and Hearing Disorders, Faculty of Education and Rehabilitation Sciences, University of Zagreb, Croatia

[3]Department of Special Education and Rehabilitation, Speech and Language Therapy, Faculty of Education, University of Ljubljana, Slovenia

Corresponding author: Lidija Šmit Brleković, e-mail: lidija.smit@gmail.com

Received: 31.10.2025
Accepted: 27.01.2026

ORIGINAL RESEARCH ARTICLE
UDK: 81'23:[811.163.42+811.163.6]
DOI: https://doi.org/10.31299/hrri.62.si.9

Abstract: *One of the most prominent characteristics of developmental language disorder (DLD) is limited vocabulary size and poor vocabulary composition. Through a cross-linguistic comparison of vocabulary breadth based on the CDI-III, we aimed to determine whether language and children's language status can affect the vocabulary of 41- to 48-month old children with typical language development (TLD) and those with DLD. Children with DLD were observed to have a smaller vocabulary than children with TLD, even in semantic categories containing words typically acquired at earlier stages of language development. Therefore, it is not language itself that contributes to differences between groups, but rather the children's language status, i.e., the presence of a language disorder (TLD vs DLD).*

Keywords: *vocabulary development, developmental language disorder, Communicative Development Inventory – III, Croatian, Slovenian*

INTRODUCTION

Developmental Language Disorder (DLD) is a language disorder that is not associated with a biomedical cause, autism spectrum disorder, or intellectual disability (Bishop et al., 2017). It is characterised by persistent language difficulties that significantly interfere with an individual's ability to interact with their environment, and it can have a lifelong impact on social and academic achievement (McGregor et al., 2020). It is well known that vocabulary development in children with DLD is characterised by slow progress, often evident from the appearance of the first word. After the third year, vocabulary difficulties are apparent, not only in the speed of word acquisition, but also in the low lexical diversity across semantic categories, levels of abstraction, and word types. In a child with DLD, poor vocabulary development in the preschool years affects not only the breadth of their vocabulary (i.e.,) how many words they know, but also its depth (i.e.,) how well they know the words and how efficiently they can use them. Both measures of vocabulary - breadth and depth - have a direct impact on success in everyday spoken communication, as well as on the ability to learn to read during the school years (McGregor et al., 2013). Previous research on children with DLD and TLD using one of the MacArthur-Bates Communication Development Inventories, the CDI-III, has shown that children with DLD achieve significantly lower vocabulary scores (Eriksson & Myrberg 2023; Tulviste & Schults, 2020). Difficulties in lexical develop-

ment will inevitably affect the development of other language components, particularly grammar (Gabaj et al., 2024; Šmit Brleković, 2026).

The present study examines the vocabulary knowledge of children with TLD and those with DLD who speak different, but closely related languages: Croatian and Slovenian. The research question addressed is: What is the impact of language and children's language status (TLD vs DLD) on the vocabulary knowledge of children aged 41 to 48 months?

METHODS

Participants

The study included two language groups: 38 Croatian speakers (32 boys and 6 girls) and 38 Slovenian speakers (30 boys and 8 girls), between the ages of 41 to 48 months. Within each language group, participants were further categorised by language status: 19 children with TLD and 19 with DLD. Categorisation into the DLD group was determined according to the CATALISE criteria (Bishop et al., 2017), as well as standard scores (T-score ≤ 80; see Table 1) from the Croatian (NRDLS-HR; Edwards et al., 2019) and Slovenian adaptations of the New Reynell Developmental Language Scales (NRDLS-SI; Edwards et al., 2024). The same test was used to confirm typical language development in the TLD group (T-score ≥ 80). All children spoke only Croatian or Slovenian, and almost all (95%) attended kindergarten. The children with DLD did not have any known additional cognitive, sensory, or behavioural difficulties, and 76% of these children attended speech-language therapy. In the majority of cases (86%), mothers completed the CDI-III. Furthermore, 46% of parents had completed less than 12 years of schooling (8 Croatian mothers, 9 Croatian fathers, 6 Slovenian mothers, and 12 Slovenian fathers), while 54% had completed more than 12 years of schooling (11 Croatian mothers, 10 Croatian fathers, 13 Slovenian mothers, and 7 Slovenian fathers).

Table 1. *Results on Comprehension and Production NRDLS-HR and NRDLS-SI Scales for Children with TLD and DLD*

	Children with TLD			**Children with DLD**		
	M (SD)	***Min***	***Max***	***M (SD)***	***Min***	***Max***
NRDLS-HR Comprehension Scale	105.67 (10.76)	85	123	70.21 (2.59)	69	76
NRDLS-HR Production Scale	100.93 (11.04)	82	123	70.16 (2.58)	60	78
NRDLS-SI Comprehension Scale	100.21 (14.40)	81	124	73.47 (6.70)	69	90
NRDLS-SI Production Scale	98.74 (7.54)	84	111	75.53 (6.94)	69	95

DLD, developmental language disorder; M, mean; NRDLS-HR, New Reynell Developmental Language Scales (Croatian adaptation); NRDLS-SI, New Reynell Developmental Language Scales (Slovenian adaptation); SD, standard deviation; TLD, typical language development

Materials and procedure

A total of 76 parents completed the Croatian (Kuvač Kraljević et al., in press) and Slovenian (Penko et al., in press) versions of the CDI-III. Both versions are based on the Swedish CDI-III (Eriksson, 2017; see the Croatian and Slovenian CDI vignette in the first part of this special issue for a description of the scales and their validity data; also see Šmit Brleković & Kuvač Kraljević, 2023; Penko et al., 2025).

In the present study, only the Vocabulary section was analysed, in which parents report whether a child produces a word or not (a forced dichotomous choice). Parents of children with TLD (n = 38), who reported on their child's language ability using the CDI-III, were recruited through the kindergartens that their children attended. Parents of children with DLD (n = 38) were recruited by speech and language therapists (SLTs). Parents were first informed about the study by the SLTs;

after providing written informed consent, they received further information on how to complete the CDI-III. Parents of children with DLD completed the CDI-III during the NRDLS assessment, which was administered by the SLTs in a clinical setting. Parents of children with TLD completed the CDI-III at home, and SLTs administered the NRDLS in kindergartens. The study was approved by the Ethics Committees of the Faculty of Education and Rehabilitation Sciences at the University of Zagreb (No.251–74/22–01/2) and the Faculty of Education at the University of Ljubljana (2/2024).

Data analysis

An assessment of the distribution of the total number of words indicated that it met the assumptions of normality, and the distributions were symmetrical. Only the number of food words produced in both languages showed platykurtic distributions, violating the assumption of normal kurtosis. There were no missing data. An analysis of variance (ANOVA) was performed to examine the impact of the independent variables - language and children's language status (TLD/DLD) - on the vocabulary of Croatian- and Slovenian-speaking children with TLD and DLD.

RESULTS

Based on the study sample, Croatian children with TLD were reported to produce more words than their Slovenian peers (see Appendix A). Conversely, in the DLD group, Slovenian children were reported to produce a slightly higher number of words than Croatian children with DLD. In both groups, the largest differences were observed in the categories of cognitive and emotional words.

Table 2. *Analysis of variance for CDI-III vocabulary sections based on language and children's language status*

Vocabulary	Variables	*Df*	*MS*	*F*	*P*	η^2_p
Food	Language	1	1.592	.228	.634	.003
	Children's l anguage status	1	150.645	21.597	< .001	.231
	Language x Children`s language status	1	6.961	.998	.321	.014
Body	Language	1	30.316	1.356	.248	.018
	Children`s language status	1	345.316	15.448	< .001	.177
	Language x Children`s language status	1	21.053	.942	.335	.013
Cognition	Language	1	29.066	.652	.422	.009
	Children`s language status	1	1621.066	36.381	< .001	.336
	Language x Children`s language status	1	156.329	3.508	.065	.046
Emotion	Language	1	47.368	1.454	.232	.020
	Children`s language status	1	732.842	22.501	< .001	.238
	Language x Children`s language status	1	92.842	2.851	.096	.038
Total	Language	1	32.895	.106	.746	.001
	Children`s language status	1	9641.263	30.979	< .001	.301
	Language x Children`s language status	1	862.316	2.771	.100	.037

MS, Mean squares, $\eta^2_{p,}$ effect size, $p < .01$

A two-way ANOVA was conducted to examine the effects of language (Croatian and Slovenian) and children's language status (TLD vs DLD) on the total vocabulary of the children, as well as separately for all four semantic categories (Table 2). The results show that language did not have a statistically significant effect on any of the analysed variables. In contrast, children's language status (TLD vs DLD) was significant for each variable, with a large effect size. None of the interactions between language and children's language status (TLD vs DLD) were statistically significant. Children with TLD, regardless of whether they spoke Croatian or Slovenian, used more words in their language production from the limited number of words in the CDI-III (Fig. 1). Moreover, regardless of the semantic category, children with TLD used more words across all categories than children with DLD.

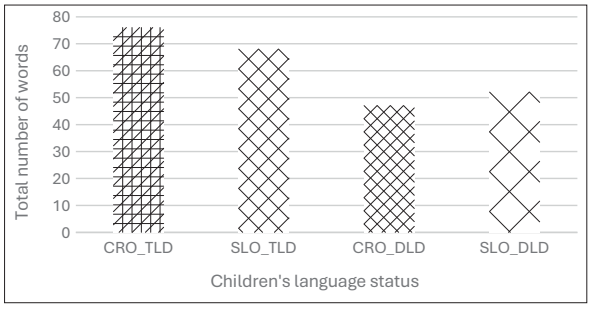

Figure 1. *Bar chart depicting the total number of words used across different language status groups (Croatian and Slovenian groups with TLD and DLD)*

DISCUSSION AND CONCLUSION

Using the simple method of collecting data on child language development via parental reports, in this case the CDI-III, we aimed to determine how the language (Croatian vs Slovenian) spoken by children and their language status (TLD vs DLD) can influence their vocabulary between the ages of 41 and 48 months.

Although there were differences between languages in most semantic categories, ANOVA results indicated that language itself did not influence the differences in vocabulary development. Instead, the ANOVA revealed that differences in total number of words, as well as in specific semantic categories are related to children's language status (TLD vs DLD).

DLD results from a complex interaction of multiple genetic and environmental factors that alter language processing at the neural level, leading to persistent and significant consequences for everyday functioning. Therefore, regardless of the language children are exposed to, those with DLD tend to show significant difficulties in vocabulary development (Bishop et al., 2017; McGregor et al., 2013). In the present study, children's language was assessed using two CDI-III inventories – Croatian and Slovenian – both consisting of almost the same words (89% overlap), as these are appropriate for the age range targeted by the inventory. The data indicate that children with DLD have poor vocabularies, regardless of whether they speak Croatian or Slovenian. Moreover, children in the DLD group also have a limited vocabulary and reduced lexical diversity across various semantic categories. Similar results were reported in studies conducted by Eriksson and Myrberg (2023) and Tulviste and Schults (2000), in which the CDI-III was used to compare children with DLD and children from the normative sample.

The findings of the present study indicate that children with DLD experience difficulties in vocabulary acquisition, even in the early stages of language development. Moreover, they struggle even with less demanding, concrete words such as those related to food and the body. This confirms the challenges they face in acquiring, storing, and retrieving words from the outset of lexical development, regardless of the language spoken by the child. This also means that, without intervention, children with DLD are at high risk of continuing to experience increasingly significant vocabulary difficulties as they age. According to a recent systematic review by Ansari et al. (2025), integrated intervention approaches that combine various methods and incorporate both explicit and incidental word-learning strategies are most effective for vocabulary development in children with DLD. An important factor in such intervention approaches is the selection of target words, which should primarily be drawn from the child's personal life and interests, or the preschool and

later school curriculum, as these provide more opportunities for incidental reinforcement.

The fact that language did not emerge as a significant factor in the present study supports the adequacy and validity of the CDI-III adaptations across different languages. Adaptation of a test or scale refers to the linguistic and cultural harmonisation of its items. A properly implemented adaptation procedure ensures the collection of reliable data on a child's language, speech, and communication skills. Well-designed parental report scales can thus be a valuable addition to the data collected directly by the SLT during an assessment, as demonstrated by the results of the present study and previous research such as Eriksson & Myrberg (2023).

In addition to the conclusion, two limitations should be noted: a relatively small sample size and a higher proportion of males in the sample. These limitations affect the data, as sex has been shown to significantly influence lexical development even after the third year, typically favouring girls (Eriksson, 2017; Šmit Brleković, 2026). However, it should be emphasised that this bias impairs generalisability more in children with TLD than in those with DLD. Since the prevalence of DLD is three times higher in boys than in girls (McGregor, 2020), the representation of DLD children in this study sample is justified.

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Appendix

Table A. *Descriptive data on vocabulary in two language (Croatian and Slovenian) and children's language status (TLD/DLD) groups*

Study group	Vocabulary	*Total items*	*Min*	*Max*	*M*	*SD*	Skewness		Kurtosis	
							Value	*SE*	*Value*	*SE*
Croatian TLD	Food	16	7	16	13.42	1.98	- 1.858	.524	5.712	1.014
	Body	26	14	24	20.89	2.82	- .722	.524	.207	1.014
	Cognition	30	15	29	21.37	4.19	.120	.524	- .895	1.014
	Emotion	28	14	28	21.00	3.22	- .099	.524	.565	1.014
	Total	100	59	94	76.68	9.42	- .023	.524	- .675	1.014
Slovenian TLD	Food	16	4	16	13.11	2.74	- 2.154	.524	6.292	1.014
	Body	26	8	26	18.58	5.09	- .575	.524	- .507	1.014
	Cognition	30	5	30	19.74	7.58	- .396	.524	- 1.021	1.014
	Emotion	28	7	28	17.21	6.39	.098	.524	- .991	1.014
	Total	100	27	100	68.83	20.18	- .343	.524	- .559	1.014
Croatian DLD	Food	16	7	15	10.00	1.79	10.31	.524	2.242	1.014
	Body	26	10	22	15.58	3.67	.173	.524	- 1.229	1.014
	Cognition	30	2	21	9.26	5.00	.629	.524	.114	1.014
	Emotion	28	3	21	12.58	5.04	- .190	.524	- .992	1.014
	Total	100	27	76	47.72	13.09	.203	.524	- .223	1.014
Slovenian DLD	Food	16	3	15	10.89	3.63	- 1.217	.524	.240	1.014
	Body	26	1	26	15.37	6.48	- .490	.524	.139	1.014
	Cognition	30	1	30	13.37	8.83	.349	.524	- .974	1.014
	Emotion	28	0	28	13.21	7.30	.179	.524	- .636	1.014
	Total	100	5	99	52.84	24.02	- .024	.524	- .248	1.014

DLD, developmental language disorder; M, mean; N, number; SD, standard deviation; SE, standard error; TLD, typical language development