Volume 49/No2/2024

Logopedics Phoniatrics Vocology

Taylor & Francis
Taylor & Francis Group

ISSN: (Print) (Online) Journal homepage: informahealthcare.com/journals/ilog20

Developmental language disorder: similarities and differences between 6-year-old mono- and multilingual children

Ulrika Schachinger-Lorentzon, Emilia Carlsson, Eva Billstedt, Christopher Gillberg & Carmela Miniscalco

To cite this article: Ulrika Schachinger-Lorentzon, Emilia Carlsson, Eva Billstedt, Christopher Gillberg & Carmela Miniscalco (16 Apr 2024): Developmental language disorder: similarities and differences between 6-year-old mono- and multilingual children, Logopedics Phoniatrics Vocology, DOI: 10.1080/14015439.2024.2338093

To link to this article: https://doi.org/10.1080/14015439.2024.2338093

Published online: 16 Apr 2024.

LOGOPEDICS PHONIATRICS VOCOLOGY
https://doi.org/10.1080/14015439.2024.2338093

Taylor & Francis
Taylor & Francis Group

RESEARCH ARTICLE

OPEN ACCESS Check for updates

Developmental language disorder: similarities and differences between 6-year-old mono- and multilingual children

Ulrika Schachinger-Lorentzon[a,b], Emilia Carlsson[a], Eva Billstedt[a], Christopher Gillberg[a] and Carmela Miniscalco[a,b]

[a]Gillberg Neuropsychiatry Centre, Institute of Neuroscience and Physiology, Sahlgrenska Academy, University of Gothenburg, Sweden; [b]Department of Pediatric Speech and Language Pathology, Queen Silvia Children's Hospital, Sahlgrenska University Hospital, Gothenburg, Sweden

ABSTRACT

This study investigated language ability in 6-year-old mono- and multilingual children who, at age 2;6 years, had screened positive for developmental language disorder (DLD). One hundred children (32 girls, 68 boys) were assessed at an average age of 2;9 years (T1) and 85 of them (30 girls, 55 boys) were reassessed at age 6;0 years (T2) using a standardised test battery. Of these, 68 (23 girls, 45 boys) met the criteria for DLD diagnosis; 28 of them were monolingual and 40 multilingual. Language profiles at T2 were analysed, as were the associations between DLD and a mono- or multilingual background as well as other measures collected at T1, including mean length of utterance (MLU), heredity and parental education. As expected, the results showed that the total group (including both mono- and multilingual children) scored below test norms for 6-year-olds on all language tests, except for receptive vocabulary, where the monolingual children scored in line with those norms. The multilingual group performed significantly less well than the monolingual one on language comprehension, receptive vocabulary, recalling sentences, word finding and story retelling; disparities regarding MLU and language comprehension were already evident at T1. Interestingly, MLU at T1 showed a moderate association with language comprehension at T2 in the total group. The monolingual children were more likely than the multilinguals to have heredity for DLD or reading and writing disorders. In conclusion, language difficulties identified through screening and assessment before age 3 years often persist at age 6 years.

ARTICLE HISTORY
Received 20 September 2023
Revised 27 February 2024
Accepted 28 March 2024

KEYWORDS
Language disorder; language ability; language development; mean length of utterance; bilingualism

Introduction

As a result of population movements in recent decades, it is now more common in the Western world for a person to be multilingual than monolingual [1]. The definitions of those terms may vary across the world. In the present study, 'multilingual' refers to children growing up in a family and social environment where one or more languages other than the dominant one of their society – in this case, Swedish – are also spoken. Hence, 'monolingual' children are those living in homes where (virtually) only Swedish is spoken. Furthermore, a 'second language' is a language that a person learns, without being formally taught it, after learning one (or more) 'first language(s)'.

Any comparison between monolingual and multilingual children is potentially hampered by the influence of factors other than the ability to acquire languages *per se*, such as the children's linguistic environment, social conditions and cognitive ability [2]. The method used here, which involves group comparison against norms, must always be carried out with certain reservations, but it is a method most often used in research contexts [3]. Specifically, we investigate a group of children who scored positive for language difficulties at the screening performed by the Swedish Child Health Service (CHS) when they were 2;6 years old and were then referred to a speech and language pathology clinic. They were consecutively recruited to the present study.

This study also specifically aims to explore possible differences in language ability between mono- and multilingual children who were diagnosed with developmental language disorder (DLD) after a detailed assessment by a speech and language pathologist (SLP) at the ages of 2;9 years and 6;0 years.

It appears that early language development is stable and follows a similar progression in all languages regardless of whether a child is mono- or multilingual [4–6]. Multilingual children will generally have acquired a basic vocabulary in their second language at the age of 6–7 years or after two years of attending a pre-school where that language is spoken [6]. Of the various language-development processes, that of acquiring complex syntax (e.g. word order, subordinate clauses) is least affected by multilingualism [7]. This does not mean that multilingual children use flawless grammar early on, only that they learn the syntax of a second language faster than its vocabulary, phonology and so on [8]. There is a widely accepted belief that it takes 4 to 6 years after introduction for a child to acquire a second language at the same

CONTACT Ulrika Schachinger-Lorentzon ulrika.s.lorentzon@vgregion.se Gillberg Neuropsychiatry Centre, Institute of Neuroscience and Physiology, Sahlgrenska Academy, University of Gothenburg, Sweden

level as that of a monolingual school-age child, but a longitudinal Canadian study found that this is not always correct; potentially influential background factors such as socio-economic status (SES) and the quality and quantity of exposure to the second language play a major role [9–11].

In Sweden, most children attend pre-school from 1–2 years of age, which makes pre-school the setting where they spend most of their waking time [12]. However, children living in disadvantaged areas with low SES where few people speak either Swedish or those children's first language(s) are at risk of developing a limited vocabulary in all of their languages [13] owing to the inadequate quantity and quality of language exposure.

Several research studies have focused on possible influential factors for delayed language development in multilingual children as compared with monolinguals.

According to a systematic review, however, there is limited evidence to support the idea that multilingual children generally develop language at a slower pace than monolingual children [14]. Other risk factors for DLD were also reported, including the mother having arrived in Sweden within one year from a child's birth or the parents needing an interpreter after spending 5 years in Sweden [15]. In a study of scores on the CELF-4 language test obtained by Swedish schoolchildren aged 7–8 years [10], multilinguals performed below the average range (mean 62.31) while monolinguals performed within the average range (mean 91.81). Furthermore, 80% of the multilinguals' test results, compared with 30% of the monolinguals' ones, were more than one standard deviation (SD) below the norm [16]. The same study also included data on parents' level of education and on whether the children attended after-school programmes (allowing them to spend a few hours after the end of the school day under the supervision of trained staff). As a proxy for the SES of the schools and neighbourhoods, information about the percentages of multilingual students and university-educated parents in each school district was obtained. The results showed an association between maternal level of education and test scores, suggesting that maternal level of education is a relevant SES factor. In addition, there was a strong correlation between school-district SES and whether students attended after-school programmes; by contrast, multilingualism explained only a small part of the results [10].

A further point to be remarked upon is that, within the CHS, there is a rather widespread but much-debated 'wait and see' approach: many – 74% according to a study focusing on Arabic-speaking children [17] – nurses believe that multilingual children have an overall slower language development and therefore tend to wait longer before they refer such children to an SLP.

All of the studies discussed above highlight the importance of considering background and environmental factors in language assessments where only monolingual norms are available and of being aware that low scorers may be at risk of persistent language difficulties (resulting in DLD) rather than just being 'late talkers' who will eventually catch up with their peers.

In Sweden, both mono- and multilingual children undergo systematic language screening by the CHS at 2;6 or 3 years of age, which is an optimal screening age according to international research [18]. Children with suspected DLD are referred to an SLP for diagnostic assessment. Given that language assessment is complex and that communicating the meaning of a language diagnosis to the child's carer in a compliant way is a very challenging task [19], researchers debate whether multilingual children are over- or under-diagnosed with DLD [10]. A recently published international study showed that, globally, SLPs are confident about their ability to assess and diagnose children with DLD [20]. However, there may be a risk of over-diagnosis when a multilingual child is assessed only in a (second) language that he or she has not yet fully developed, with reference to norms intended for monolinguals. For example, the incorporation – or 'transfer' – of the grammar of the first language(s) into the second language may have a negative impact on language test scores [13]. On the other hand, under-diagnosis may occur when multilingual children are not expected to have as well-developed language abilities as monolingual children and are therefore given simplified tests or are assessed based on norms for younger children, or where SLPs assume that their language difficulties are due to their multilingualism and will resolve of their own accord [21]. Furthermore, in order for a multilingual child to be diagnosed with DLD, he or she must in principle present with DLD in all of his or her languages. However, multilingual children may be incorrectly diagnosed with DLD because no diagnostic tools are available in their first language(s) rather than because of language difficulties *per se* [10]. Against the background of the theoretical account given at the beginning of this section, being a multilingual child would not seem to be a risk factor for DLD in and of itself. However, Andersson et al. [10] suggest that a range of additional factors should be considered when DLD is assessed in multilingual children, including the quality and quantity of second-language exposure as well as various SES factors, and that, if possible, the child should be tested in all of his or her languages [5].

In a broader context of language development, it is crucial to recognise that the cause of DLD is presumably multifactorial [22]. Even so, DLD does seem to run in families, meaning that it is important to investigate for the presence of early signs of language difficulties. One study showed that monolingual children with DLD have greater and more persistent language difficulties if their lexical debut was late [23]. In addition, a limited vocabulary at the age of 3 years has been reported to predict an increased risk of cognitive deficits related to verbal comprehension, working memory and perceptual reasoning at the age of 7 years [24]. Hence an SLP assessing a multilingual child needs to examine not only all language abilities (that is, perform the same assessment as for a monolingual child) but also the quality, quantity, duration and frequency of the child's exposure to the second language [25]. As regard the heredity of DLD, genetic studies including family aggregation report a level of up to 40% [22, 26]. However, one study focusing on monolingual and multilingual children showed that heredity was not a risk factor for language comprehension, recalling sentences, non-word repetition and narrative ability. These measures

have previously been documented as valid when it comes to identifying DLD in both mono- and multilingual children [5, 13, 27, 28]. Furthermore, in order to fully assess a multilingual child's language skills, it is necessary to obtain information about early language milestones and heredity (both of which are also important factors in the language development of multilingual children [29]).

The present study contributes information on language ability in both multi- and monolingual children who screened positive for DLD at the age of 2;6 years in the systematic general language screening performed by the CHS and then underwent an SLP assessment at the age of 2;9 years [30]. As regard the methods used, it is generally considered advisable to use standardised tests in SLP assessments. However, there is not yet a nationally established 'gold standard' assessment method in Sweden, even though access to standardised tests has improved in the past decade. For this reason, Swedish SLPs must sometimes rely on UK or US norms, which naturally reflect the social structure of those countries.

The overall aims of this longitudinal follow-up study are to examine the language profiles of 6-year-old mono- and multilingual children who already had suspected DLD before the age of 3 years as well as to explore how those language problems and other background data relate to their later language development.

The following research questions are posed:

i. Is there a difference in language ability at the age of 6 years between monolingual children with DLD and multilingual children with DLD?
ii. Are background factors such as lexical debut, mean length of utterance (MLU) at the age of 2;9 years, heredity and parental education associated with language ability in children with DLD at the age of 6 years?
iii. What are the differences, if any, between monolingual and multilingual children in terms of the importance of various background factors?

Methods

This is a clinical longitudinal study, which originally included 100 children (of which 51 were multilingual) who were assessed in 2016 for suspected DLD before the age of 3 years. They had all first gone through the general language screening in Gothenburg, a Swedish metropolitan region consisting of areas with varying SES characteristics (for more details, please see [30]). A team of SLPs uniformly assessed the study group at T1 at a mean age of 2;9 years using a validated language-comprehension test targeting sentences and words [31], with a cut-off for DLD of 1.5 SDs below the age-specific norm, as well as an analysis of spontaneous speech based on MLU. Multilingual children were assessed in their first language with the assistance of an interpreter or a parent. An interpreter was used for a total of 12 families. The children's parents were interviewed by the SLP about their family history, heredity (specifically for DLD, reading and writing disorders, attention-deficit hyperactivity disorder (ADHD), autism and intellectual disabilities), the child's early language development (babbling development, lexical debut), their own level of education (as an SES measure), any other medical conditions related to language ability and, where appropriate, the child's exposure to Swedish as a second language [30].

At the age of 6 years, all 100 children were invited to participate, along with their parents, in a follow-up assessment; 85 of them (of which 40 multilingual children) agreed to participate.

The demographic and language data obtained at T1 (for the 68 children diagnosed with DLD at the age of 6 years among the 85 children who completed the full study) are presented in Table 1.

The mean age at T2 in the total group ($n = 85$, i.e. including both mono- and multilingual children) was 6;0 years (range: 5;01–6;11); it was 6;0 years for the monolingual group and 6;1 years for the multilingual group. An interpreter was used to help with translation for eight families.

Participants

Of the total study group examined at T2, 80% ($n = 68$; 23 girls and 45 boys) were diagnosed with DLD, meaning that they met the criterion of scoring 1.5 SDs or more below the age-specific norm on at least two language tests [32]. The remaining children either met the criteria for speech sound disorder ($n = 6$) or were given no diagnosis at all ($n = 11$). Of those diagnosed with DLD, 59% were multilingual ($n = 40$; 16 girls and 24 boys) and 41% were monolingual ($n = 28$; 7 girls and 21 boys).

A total of 22 different first languages were represented in the multilingual DLD group, and 13 children had two or more first languages. The most frequent first languages in the multilingual group were Somali, English and Arabic. All children diagnosed with DLD at T2 were born in Sweden, and they came from all residential areas of Gothenburg. They had all started attending pre-school at the age of 1–2 years – which represented the onset of the acquisition of Swedish as a second language for the multilingual children – and had since regularly attended pre-schools staffed by Swedish-speaking teachers entrusted with the task of stimulating their development of Swedish. Finally, all parents reported that Swedish was their child's most developed language.

Language measures used at the age of 6 years

Several language tests were administered at T2 when the participants were 6 years old. They are described below, and key information about them is provided in Table 2.

To assess language comprehension, the *Test for Reception of Grammar* (TROG-2) [33] was used. Language comprehension, which consists of receptive vocabulary, semantic knowledge and morphosyntax, is a prerequisite for a person's language skills to develop in an expected way [34]. Swedish norms are available and were used in this study.

To assess receptive vocabulary, the *Peabody Picture Vocabulary Test-4* (PPVT-4) [35] was used. Receptive

Table 1. Background data and language status at T1 in the DLD group broken down into total, mono- and multilingual groups.

	DLD			
	Monolingual *n* = 28 (%)	Multilingual *n* = 40 (%)	Total *n* = 68(%)	Significant value mono/multi
Gender: male	21 (75)	24 (60)	45 (66)	0.29
Heredity	18 (64)	15(38)[a]	33(49)[b]	0.049*
Language ability				
Typical babbling development	22 (79)	29 (73)[c]	51 (75)[d]	1.00
Lexical debut (mean in months)	15[e]	17[f]	17[g]	0.22
MLU at 2;9 years (mean)	2.0	1.6	1.8	0.04*
Reynell Developmental Language Scales raw score at 2;9 year (Language comprehension test)	33	17	24	<0.01*
Maternal Educational level[h]				0.24
Compulsary	1(4)	8(20)	9 (13)	
High school	10 (36)	14 (35)	24 (35)	
University	15 (54)	16 (40)	31 (46)	
Paternal Educational level[i]				0.12
Compulsary	0 (0)	5 (13)	5 (7)	
High school	17 (61)	15 (38)	32 (47)	
University	9 (32)	15 (38)	24 (35)	

Note: *denotes to a statistically significant (<.05) group difference. Notes: [a]*n* = 39, [b]*n* = 67, [c]*n* = 37, [d]*n* = 65, [e]*n* = 25, [f]*n* = 36, [g]*n* = 61, [h]*n* = 64 monolingual *n* = 26, multilingual = 38, [i]*n* = 61, monolingual *n* = 26, multilingual *n* = 35, MLU = Mean length of utterance.

Table 2. Language tests, with cut-offs for DLD, administered at the follow-up assessment (T2) at age 6 years.

Test	Assesses	DLD cut-off
Test for Reception of Grammar, 2nd edition (TROG-2)	Language comprehension	≤80 SS from age norm
Peabody Picture Vocabulary Test, 4th edition (PPVT-4)	Word comprehension	≤80 SS from age norm
Clinical Evaluation of Language Fundamentals, 4th edition (CELF-4))	Recalling sentences	≤-5 ScS from age norm
NELLI (a neurolinguistic examination procedure for DLD children): recalling of words and non-words	Phonological ability	−1.5 SD from max RS
Word Finding Vocabulary Test (WFVT)	Vocabulary	−1.5 SD from age mean
Wechsler Non-verbal Scale of Ability (WNV), Matrices sub-test	Non-verbal ability	Evaluated in T-score, but no cut-off
The Bus Story	Story retelling	−1.5 SD from age mean
Narrative Assessment Protocol (NAP)	Narrative	Qualitative assessment

Note: SS = standard score, ScS = scale score, RS = raw score.

vocabulary refers to a person's ability to understand words presented orally. US norms were used, since no Swedish norms for the relevant age range are available.

To assess recalling sentences, the *Clinical Evaluation of Language Fundamentals-4* (CELF-4) [35] was used. Studies show that after only two years of exposure to a second language, multilingual children with typical language development manage to recall sentences at the same level as monolinguals [7]. This is one of the most sensitive and specific markers of DLD [36,37]. Swedish norms were used.

To assess non-word repetition, a commonly used Swedish test called *NELLI – a neurolinguistic examination procedure for DLD children* [38] was used. Non-word repetition (NWR) is another well-known clinical marker of DLD. The child repeats 'non-words', that is, words without semantic content [28]. In mono- and multilingual children with typical language development, NWR is not sensitive to SES [28]. Since multilingual children (without DLD) perform better on complex non-words than children with DLD do, NWR is important to differentiate between multilingualism and DLD [7]. There are Swedish norms for ages 4:00–5:11 years which are based on 188 mono- and multilingual children, with a mean raw score of 14.2–15.6. To enable inclusion of all children in the study, a cut-off of 1.5 SD below the mean (i.e. a raw score of 12.45 out of the maximum 18) was used.

To assess expressive vocabulary, the *Word Finding Vocabulary Test* (WFVT) [39] was used. It assesses an individual's ability to retrieve and produce specific words or vocabulary from memory. Expressive vocabulary is important – alongside other language abilities – for story retelling [40]. UK norms were used.

To assess story-retelling ability, the *Bus Story Test* (BST) [41] – a well-established clinical-assessment instrument – was used. Asking children to tell a story represents a naturalistic way of assessing their language ability, but children with DLD find it difficult to produce narratives themselves [42]. The authors of an earlier systematic review of narrative ability (i.e. story generation and retelling) also focus on how to differentiate multilingualism from DLD, since multilingual children with or without DLD can perform differently on formal language tests, but not always regarding the content and sequencing of a narration [13]. Swedish norms are available for the BST and were used in this study. Further, two of the SLPs performed a reliability test for the three different parameters (information, sentence length and subordinate clauses) of the BST; this yielded an inter-rater reliability of.98 and an intra-rater reliability of.89–.98, suggesting good agreement.

To perform an in-depth analysis of the BST narratives, the *Narrative Assessment Protocol* (NAP) [43] was used. The NAP includes six dimensions: topic maintenance; explicitness; sequencing; referencing; conjunctive cohesion (i.e. use of co-ordinate sentences with conjunctions); and fluency.

Finally, to assess non-verbal ability, the *Matrices* sub-test from the *Wechsler Non-verbal Scale of Ability* (WNV) [44] was used. This measures perceptual reasoning in children and adolescents. US norms are available and were used in this study.

All tests were administered to all children, always in the same order. Two children did not participate sufficiently to obtain a result. In accordance with the instructions given in the respective test manual, a floor score was assigned in these cases: 55 standard points for TROG-2 and 20 standard points for PPVT-4.

Statistical analyses

All data were analysed using IBM SPSS Statistic Version 27 for Windows. Because the data were skewed, non-parametric tests were used.

For non-parametric pairwise comparisons and *z*-score, the Mann–Whitney *U* test was used. For correlation analysis, Spearman's rank correlation was used. To calculate categorial data, a χ^2 test (Fisher's exact test if the expected values in a 2×2 table were less than 5) was used.

Results

All 68 children with DLD obtained scores within the 'normal range' (mean T-score of 50.40) on the test of non-verbal ability (WNV). By contrast, their performance was low or very low relative to norms on almost all verbal tests (TROG-2, CELF-4, NELLI, WFVT, BST and NAP); the sole exception was the test of receptive vocabulary (PPVT-4), on which the monolingual children with DLD obtained an average score.

Comparison of Mono- and multilingual children regarding language ability

In Table 3, the results obtained on language tests by the mono- and multilingual children with DLD are compared.

The multilingual children with DLD performed consistently lower on almost all language and story-retelling tests. They had significantly greater problems than the monolingual children with language comprehension ($z=-3.47$, $p = .01$), receptive vocabulary ($z=-4.75$, $p = .01$), recalling sentences ($z=-2.08$, $p = .04$) and expressive vocabulary ($z=-5.16$, $p = .01$) as well as with telling an adequate story (BST Information) ($z=-3.08$, $p = .02$). In addition, they scored significantly lower than the monolingual children for NAP Conjunctive cohesion ($z=-2.29$, $p = .02$), NAP Fluency ($z=-2.42$, $p = .02$) and NAP Total score ($z=-2.25$, $p = .02$).

On NWR, by contrast, the multilingual group (11.48) outperformed the monolingual one (10.71). Both values are below the average of 14 correct repeated non-words for 5-year-olds with typical language development [38]. Also, this difference between the groups was not statistically significant ($z=-0.94$, $p = .35$). Two multilingual children were assigned floor scores on TROG-2 and PPVT-4.

To compare language ability at 2;9 years with language ability at 6 years, Spearman's rank correlations were computed for the mono- and multilingual groups, respectively (Tables 4 and 5).

As can be seen in Table 4, a moderate correlation was found in the monolingual group between MLU at age 2;9 and language comprehension at age 6 ($r(26) = .60$, $p = .010$) and between language comprehension at age 2;9 and recalling sentences at age 6 ($r(26) = .58$, $p = .010$). No significant correlation was found between WNV Matrices and any language measure.

As is clear from Table 5, language comprehension at age 6 and recalling sentences were moderately correlated in the multilingual group ($r(37) = .59$, $p = .010$). Recalling sentences also correlated moderately with BST Information ($r(36) = .52$, $p = .010$), sentence length ($r(36) = .51$, $p = .010$) and expressive vocabulary ($r(38) = 66$, $p = .010$). As in the monolingual group, MLU at 2;9 years correlated with language comprehension at age 6, but not as strongly ($r(38) = .42$, $p = .010$).

Language measures at 2;9 years

For the children found to have DLD at the age of 6 years ($n=68$), the data from the interviews conducted with parents when the children were 2;9 years old showed that the lexical debut for the total group was delayed by five months on average, with no statistically significant difference between monolingual and multilingual children ($p = .22$). The total-group mean was 17 months, while the 'typical' lexical debut takes place around 12 months in both mono- and multilingual children [45]. MLU at 2;9 years was 1.8 words for the total group; the expected value at that age is 3.0. The monolingual children's average sentence length was 2.0 words while that of the multilinguals was 1.6 words; this difference is statistically significant ($p = .04$). Further, the results from the RDLS test of receptive language comprehension administered at the age of 2;9 years showed a low result for the total group (a raw score of 24, as against an expected raw score of 39). The monolinguals' average raw score was 33 and that of the multilinguals was 17; again, the difference is statistically significant ($p < .01$).

Heredity and parental education

Reported heredity for neurodevelopmental disorders in the total group was high (49%). It was statistically significantly higher in the monolingual group (χ^2 (1, $N=67$) = 4.349, $p = .049$), and it mostly related to language and/or reading and writing disorders/dyslexia (64%). Regarding parental education, upper-secondary school was the most common level of education among fathers, while more mothers had attended university. There was no significant difference between mono- and multilingual children regarding any level of maternal education (χ^2 (3, $N=68$) = 4.155, $p = .24$) or paternal education (χ^2 (3, $N=68$) = 5.979 $p = .12$).

Discussion

The overall aim of this study was to investigate language ability in 6-year-old mono- and multilingual children with DLD. As expected, the total group of children with DLD generally

Table 3. Comparison of results on language tests obtained by Mono- and multilingual children with DLD at the follow-up assessment at age 6 years.

Test variables	DLD Total ($n=68$)	DLD Monolingual ($n=28$)	DLD Multilingual ($n=40$)	Significant value	*Z*-score
	Mean (SD) Min–Max	Mean (SD) Min–Max	Mean (SD) Min–Max		
TROG – 2 (SS)	73.32 (13.84) 55–112	80.61(12.57) 61–112	68.22(12.45) 55–91	<0.01*	−3.47
PPVT – 4 (SS)	88.69 (20.37) 20–129	101.64(14.23) 66–129	79.63(19.19) 20–113	<0.01*	−4.75
CELF - 4 recalling sentences (SC.S)[a]	3.34 (2.19) 0–11	4.07 (2.58) 0–11	2.83(1.74)[b] 0–7	0.04*	−2.08
Nonword repetition (RS)[c]	11.16 (5.27) 0–18	10.71(4.88) 0–18	11.48(5.58)[d] 0–18	0.35	−0.94
WFVT (RS)	23.93 (9.58) 0–42	30.96 (5.97) 19–42	19.00(8.52) 0–34	<0.01*	−5.16
BST Information[a] (RS)	8.77 (7.57) 0–30	12.00 (7.45) 0–27	6.39 (6.82)[b] 0–30	0.02*	−3.08
BST sentence length[a] (RS)	5.46 (2.81) 0–10	6.14 (2.58) 0–10	4.95 (2.89)[b] 0–9	0.09	−1.68
BST subordinate clause[a] (RS)	0.85 (1.21) 0–4	1.04 (1.35) 0–4	0.71 (1.09)[b] 0–4	0.38	−0.87
NAP topic maintenance[a] (RS)	1.05 (0.57) 0–2	1.18 (0.33) 0–2	0.95 (0.57)[b] 0–2	0.10	−1.64
NAP explicitness[a] (RS)	0.91 (0.42) 0–2	1.07 (0.47) 0–2	0.87 (0.48)[b] 0–2	0.34	−0.96
NAP sequencing[a] (RS)	0.98 (0.54) 0–3	1.07 (0.47) 0–2	0.92 (0.59)[b] 0–3	0.16	−1.40
NAP referencing[a] (RS)	0.95 (0.48) 0–2	1.07 (0.47) 0–2	0.87(0.48)[b] 0–2	0.09	−1.70
NAP conjunctive cohesion[a] (RS)	0.92 (0.44) 0–2	1.07 (0.47) 0–2	0.82(0.39)[b] 0–1	0.02*	−2.29
NAP fluency[a] (RS)	0.97 (0.50) 0–2	1.14 (0.47) 0–2	0.84(0.44)[b] 0–2	0.02*	−2.42
NAP total[a] (RS)	5.79 (2.60) 0–10	6.50 (2.25) 0–10	5.26 (2.73)[b] 6–10	0.02*	−2.25
WNV matrices (TS)	50.40 (15.92) 0–75	51.68 (13.64) 11–75	49.50(17.45) 0–70	0.72	−0.36

*Group difference of (<.05) denotes a statistical significance.

S.S. =standard scores, SC.S.= scale scores, R.S.= raw scores, T.S.= T-scores. [a]$n=66$, [b]$n=38$, [c]$n=65$, [d]$n=37$. TROG 2 = Test for Reception of Grammar, PPVT-4 = Peabody Picture Vocabulary Test, CELF = Clinical Evaluation of Language Fundamentals, WFVT = Word Finding Vocabulary Test, BST = The Bus Story, NAP = Narrative Assessment Ability, WNV = Wechsler Nonverbal Scale of Ability.

Table 4. Correlations between scores at 2;9 years (variables 1–2), scores at 6 years (variables 3–10) and non-verbal ability at 6 years (variable 11) in the group of monolingual children with DLD as diagnosed at age 6 years.

Variable	1	2	3	4	5	6	7	8	9	10	11
1. MLU at 2;9 years	–										
2. RDLS receptive test at 2;9 years	.327	–									
3. TROG-2	.595**	.322	–								
4. PPVT-4	.114	.236	.617**	–							
5. CELF-4 Recalling sentences	.285	.582**	.255	.174	–						
6. Non-word repetition (NWR)	.172	.203	.325	.298	.317	–					
7. The Bus Story: Information	.332	.410*	.396*	.292	.534**	.118	–				
8. The Bus Story: Sentence length	.330	.240	.254	.004	.553**	.219	.708**	–			
9. The Bus Story: Subordinate clauses	.323	.200	.257	.010	.620**	.147	.577**	.719**	–		
10. WFVT	.317	.309	.600**	.689**	.353	.407*	.330	.179	.221	–	
Non-verbal language ability											
11. WNV Matrices	n.s.	n.s.	n.s.	.428*	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	–

Correlations were calculated using Spearman's rho. **p=.01, *p=.05. n.s.=no significance. MLU = Mean Length of Utterance, RDLS = Reynell Developmental. Language Scales, TROG -= Test for Reception of Grammar, PPVT = Peabody Picture Vocabulary Test, CELF = Clinical Evaluation of Language Fundamentals. WFVT = Word Finding Vocabulary Test, WNV = Wechsler Non-verbal Scale of Ability.

performed below age-specific norms on the language tests administered. The main finding from this study is that there was a significant difference in language comprehension, recalling sentences and in both receptive and expressive vocabulary at the age of 6 years between mono- and multilingual children with DLD. Another interesting finding is that

Table 5. Correlations between scores at 2;9 years (variables 1–2), scores at 6 years (variables 3–10) and non-verbal ability at 6 years (variable 11) in the group of multilingual children with DLD as diagnosed at age 6 years.

Variables	1	2	3	4	5	6	7	8	9	10	11
1. MLU at 2;9 years	–										
2. RDLS receptive test at 2;9 years	.495	–									
3. TROG-2	.415	.308	–								
4. PPVT-4	.330*	.280	.733**	–							
5. CELF-4 Recalling sentences	.363*	.338*	.594**	.703**	–						
6. Non-word repetition (NWR)	.231	.135	−.149	−.124	.071	–					
7. The Bus Story: Information	.271	.188	.521**	.510**	.551**	.274	–				
8. The Bus Story: Sentence length	.342*	.134	.448**	.399*	.514**	.360*	.799**	–			
9. The Bus Story: Subordinate clauses	.451	.414**	.501**	.426**	.427**	.232	.630**	.581**	–		
10. WFVT *Non-verbal language ability*	.325*	.230	.592**	.694**	.656**	.067	.535**	.453**	.431**	–	
11. WNV Matrices	n.s.	n.s.	n.s.	.428*	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	–

Correlations were calculated using Spearman's rho. **p=.01, *p=.05. n.s.=no significance. MLU = Mean Length of Utterance, RDLS = Reynell Developmental Language Scales, TROG = Test for Reception of Grammar, PPVT = Peabody Picture Vocabulary Test, CELF = Clinical Evaluation of Language Fundamentals, WFVT = Word Finding Vocabulary Test, WNV = Wechsler Non-verbal Scale of Ability.

background factors such as maternal level of education, babbling development and lexical debut did not differ between the mono- and multilingual children at the age of 6 years. Further, the discrepancy in language ability between mono- and multilingual children already started to show at T1 (age 2;9 years), when the multilingual children had a significantly lower language comprehension. These findings will be discussed in more detail below.

Previous clinical studies regarding language assessment of multilingual children were usually conducted on groups that had not previously been screened for language difficulties, as the children in this study had. However, even with data from an earlier screening, it remains a complex task to perform differential diagnosis as between DLD and late language development or multilingualism. This underscores the importance of including clinical markers of DLD in the assessment [5,13,27,28].

In this study, a non-verbal test was carried out. All children performed within the normal range, which suggests that general learning disabilities are probably absent. Further, all children had an outcome relating to language comprehension (TROG-2) that supports DLD, with the multilingual children displaying significantly more pronounced difficulties. It is interesting to note that receptive-vocabulary ability was average in the monolingual group but at a significantly lower level in the multilingual one. This suggests that the multilingual children, who were older than the monolingual children when first encountering Swedish, may have acquired Swedish vocabulary more slowly (or at least not fast enough to have caught up with the monolinguals by the age of 6 years). Such a conclusion is confirmed by other studies describing a slower acquisition of second-language vocabulary, with the rate of acquisition depending on the extent to which the second language is spoken in the child's home and social environment [46]. This highlights the importance of extensive, high-quality exposure to a second language [47,48].

The ability to recall sentences was below average for the total group, but the multilingual group performed significantly lower than the monolingual group on this task, which measures short-term auditive verbal memory. According to other studies, typically developed multilingual children actually often outperform their monolingual peers on this task, and mono- and multilingual children with DLD are expected to perform equally well on it [49,50]. The difference in sentence recall found between the two groups in the present study may reflect more general problems with attention and/or short-term memory. It should also be pointed out that the children in the present study performed low on the task involving the repetition of non-words (NWR). The general expectation is that the Swedish phonological system will be established in children at the age of 5 years and hence able to fulfil an important supporting function in their vocabulary development. The multilingual group did slightly outperform the monolingual group on the NWR task, in line with earlier studies [28, 51], but it would appear to be a more relevant finding that both groups scored below the cut-off for 5-year-olds [38].

Alongside NWR, another well-known clinical marker for DLD is narrative ability, which is believed to reflect a child's general language ability [39]. One important prerequisite for producing a narrative is expressive-vocabulary ability, and the total group scored low for this as well as for story-retelling ability. The overall group's performance regarding expressive vocabulary corresponded to the typical level at the age of 4 years, and the multilingual group's performance corresponded to an even earlier age. In terms of story information, the total group of children with DLD performed low, and the multilingual group performed significantly lower than the monolingual one. Other research has shown that children with DLD produce more grammatically elaborate sentences in a retelling task than in a story-generation task [52,53]. Given the low scores for expressive vocabulary seen in the present study, one might expect an even worse performance on a story-generation task [54]. Indeed, the average of 5.5 words per utterance found on the BST corresponds to the typical level of a 4-year-old child [41], indicating that

the low MLU values observed at the age of 2;6 years had persisted during the pre-school period for the children included in the study. Similarly, the overall result for subordinate clauses on the BST – which, according to the manual [41], reflects syntactic complexity – corresponded to that of a typical child two years younger than the present participants were at the time. No significant difference was found between the mono- and multilingual groups for this measure of syntactic complexity. Earlier studies of multilinguals with typical language development have shown that syntax is the least affected language ability and is also acquired faster than other abilities (such as vocabulary or phonology) [7,8]. Finally, the total group showed difficulties with producing complete sentences (NAP Conjunctive cohesion) and problems with word retrieval and fluency (NAP Fluency), although the multilingual group's scores were significantly lower. Overall, this indicates that there may be an association between different grammatical abilities such as language comprehension, recalling sentences and story-retelling ability – in line with findings from earlier studies [55].

The examination of potentially influential background factors (gender, very early language development, education and heredity) associated with DLD revealed that most of the children in the total group had a parent-reported typical babbling development, and the lexical debut was equally delayed across the mono- and multilingual children. Further, according to Statistics Sweden, 40% of Sweden's population has completed a post-secondary education [56]. The information obtained in the present study shows that 48% of the mothers and 39% of the fathers had done so, meaning that they are rather well in line with the national average. Earlier studies [10] have pinpointed maternal education as a risk factor for language difficulties, but in this study, there was no significant difference between the children with and without DLD; this brings up the question of sufficient language exposure [47]. Finally, it is interesting to note that heredity for DLD or for reading or writing difficulties was reported significantly more often for monolingual children than for multilingual ones. This would seem to be well in line with the fact that one earlier study did not identify heredity as a risk factor for DLD in multilingual children [25], but other studies do highlight heredity as a risk factor, especially for reading and writing disorders [44,45]. One important aspect to consider in this context is that it may be more difficult for parents to know whether they or a family member have had literacy difficulties if they have lived in a society with different literacy requirements.

Almost all children who were found to have language difficulties at the age of 2;9 years (T1) still had such difficulties at the age of 6 years (T2), which is in line with earlier studies [57–59]. There were also significant associations, in the total group of children with DLD, between various measures of language ability at T1 and T2. For example, the recalling-sentences measure correlates not only with other expressive-language measures but also with language comprehension at both T1 and T2 in both groups; this underscores that recalling sentences is a good marker of DLD [36,49]. Furthermore, the differences found at T2 between the multi- and monolingual children were already present at T1. Since then, all children in both groups have been offered the same interventions by SLPs in parallel with attending Swedish pre-school. Hence it would be expected that at the age of 6 years – after attending pre-school for 4–5 years – the total group would achieve, if not equal, then at least more similar results on the language assessment, regardless of their mono- or multilingual background. While any comparison of monolingual and multilingual children is problematic [2], it does seem that the multilingual children in the present study were significantly more impaired than the monolingual ones with regard to core language measures of language comprehension, receptive and expressive vocabulary, sentence recalling and story retelling. Against this background, there is a need for systematically developed guidelines to determine the degree and quality of DLD in multilingual children. Well-established co-operation with other institutions that are important in a child's daily life, such as his or her pre-school, is also essential in order for the SLP to be more certain about the language assessment made.

As regards the multilingual group, there were more correlations between grammatical measures than between vocabulary measures, which lends further support to the diagnosis of DLD in these children. The low scores on measures of both expressive and receptive language in the multilingual group correlate with earlier scores on language measures (MLU and RDLS at 2;9 years), which further underscores that these children probably have language difficulties and may also, in some cases, have been insufficiently exposed to Swedish as a second language. The low scores for language measures highlight the important role that the quality and quantity of exposure to a second language plays for multilingual children. In the present case, most of the multilingual children studied come from residential areas with low SES, where the risk of inadequate exposure to Swedish is higher [9–11,13]. Since the CHS screening at the age of 2;6 years identifies children at risk of DLD, and children from socio-economically disadvantaged areas appear to have greater language difficulties, it is of great importance to reduce the gap between the language difficulties of monolingual and multilingual children when it comes to Swedish. One way to do so could be to allocate additional resources to pre-schools in those areas in order to ensure that the children will encounter good speakers both of their first language(s) and of Swedish, and that they will be able to engage in activities that promote their language development, and also to ensure that there is good surveillance and follow-up of the children's pre-school attendance.

The children in the overall DLD group – both the monolinguals and the multilinguals – had their lexical debut at about the same age, they were all born in Sweden, and they all attended pre-school from an early age. In addition, all parents of the multilingual children rated Swedish as their child's best-developed language. Furthermore, the children were screened by CHS nurses at the same age and during the same period, and there was no significant difference in parental level of education between the groups. Despite their similarity on all of these counts, however, the multilingual DLD group performed significantly lower at the age of 6 years on many of the language measures. What is more, although there was no difference in the timing of the lexical debut between the multilingual and monolingual children, one year later – at the age of 2;9 years (T1) – there was in fact a difference between

them in MLU and language comprehension. It should be kept in mind that at T1, most of the children had recently started attending pre-school, meaning that the multilingual ones had only recently been introduced to Swedish. However, it is important to point out that at T1, the children were also assessed based on their first language, with translation assistance provided by an interpreter or a parent if needed. This is in line with recommendations that multilingual children should be assessed with regard to all of their languages [5].

One question prompted by the above is whether it is more difficult for multilingual children to obtain a referral to an SLP, perhaps because of a 'wait and see' approach being taken by many CHS nurses, as has been shown to be the case in other studies [16]. In this study, however, any such 'wait and see' approach should be of limited relevance, since adaptations are made for multilingual children with regard to the screening method used [60] and since all the children were in fact referred to an SLP at the same age.

Hence, it may be more appropriate to wonder whether multilingual children have more severe DLD than their monolingual peers. It is also interesting to consider whether the children studied, if they had not been detected at the screening before the age of 3 years, would have had even more severe language difficulties at the age of 6 years.

Limitations

First, the group sizes were relatively small, which means that the results must be interpreted with caution. Second, control groups of monolingual and multilingual children with typical language development would have further strengthened the results. Third, it is not known to the authors whether any of the participating children had any other neurodevelopmental disorders, such as ADHD or autism. Fourth, although the parents of the multilingual children identified Swedish as the language that was most developed in their children, another possible limitation could be that, at the age of 6 years, the children were assessed only with regard to Swedish, considering that many researchers recommend that the assessment should include all of a child's languages [8]. However, assessing the children in the 22 languages represented in the group could in fact have made it difficult to achieve a consistently equivalent assessment that would be sufficiently comparable with the monolingual assessment. Indeed, group norms for multilinguals are difficult to establish even when the group is so defined that it becomes relatively homogeneous [61]. What is more, all the children were suspected of having, and were assessed for, DLD at the age of 2;9 years, which implies that they had language difficulties regardless of whether they were mono- or multilingual.

Conclusions

This study aims to contribute to research about mono- and multilingual children with DLD. The language screening performed at the age of 2;6 years predicts persistent DLD at the age of 6 years rather well. While very early language development was similar across the total group, differences in terms of language comprehension and vocabulary between the mono- and multilingual children were significant even at the age of 2;9 years. The multilingual group showed significantly greater difficulties at that age, and those difficulties were found to persist at the age of 6 years.

Given the generally greater language difficulties of the multilingual group, there is a need to examine the type and frequency of language interventions offered to children with DLD. Further, since we know that the degree of exposure to a second language is important for its development, closer co-operation should be established in Sweden between SLP clinics and pre-schools, which exert a great impact on – especially multilingual – children's language and other development through their educational activities.

Acknowledgements

We wish to thank all participating children and parents at the Department of Pediatric Speech and Language Pathology, Queen Silvia Children's Hospital, Gothenburg, Sweden. We would also like to thank the students on the Speech and Language Pathology Programme who contributed to this study. This study was supported by grants from the ALF Agreement on Medical Education and Research at the Sahlgrenska University Hospital, Gothenburg, Sweden.

Disclosure statement

No potential conflict of interest was reported by the author(s).

Patient-consent statement

Parents of all participants have given their written consent to the study in accordance with the Declaration of Helsinki. An interpreter was used when needed.

Permission to reproduce material from another source

No reproduced material was used in this study.

Geolocation supplements

This study was conducted at the Sahlgrenska University Hospital and led by the research team at the Gillberg Neuropsychiatry Centre, Sahlgrenska Academy, University of Gothenburg, Sweden.

Ethical approval

The present study is part of a larger project approved by the Swedish Ethical Review Authority (Ref. Nos. GU-306-17 and T1045-18).

Data availablity statement

The data that support the findings of this study are available from the corresponding author upon reasonable request.

Funding

Agreement on Medical Training and Research (ALF) between the Swedish Central Government and the Sahlgrenska University Hospital, Gothenburg, Sweden; The Local Research and Developmental Council, Göteborg and Södra Bohuslän.

Notes on contributors

Ulrika Schachinger Lorentzon is a speech and lanugage pathologist and Med.dr at the Gillberg Neuropsychiatry Centre, University of Gothenburg and has many years of clinical experience working with children with early language difficulties and their families. Ulrika divides her clinical time between the Department of Pediatric Speech and Language Pathology and the Neuropsychiatric Clinic for Children and Adolescents at the Sahlgrenska University Hospital. As a specialist, Ulrika has led the effort to offer evidence-based speech and language pathological methods at the Department of Pediatric Speech and Language Pathology.

Emilia Carlsson is a speech and language pathologist and head of programme at the SLP unit at the University of Gothenburg. She is responsible for the courses on development-related communication and swallowing disorders in semester 2 and semester 4. She received her degree in SLP from the University of Gothenburg in 2007 and subsequently her master's degree in 2012. She recently received a doctoral degree from the University of Gothenburg, the Institute of Neuroscience and Physiology at the Unit for Speech and Language Pathology and at the Gillberg Neuropsychiatry Centre (March 2019) Her thesis is entitled 'Aspects of Communication, Language, and Literacy in Autism – Child Abilities and Parent Perspectives' and focuses on language and communicative functioning in children with autism-spectrum disorder.

Eva Billstedt, Professor of Psychology, is a psychologist specialising in child and adolescent psychiatry at the Gillberg Neuropsychiatry Centre. Eva has been clinically active at the Child and Adolescent Neuropsychiatry Unit since 1992. She has also done institutional work in child health care and adolescent care. Her 2007 PhD thesis addressed autism and the use of the DISCO protocol in studies on autism.

Christopher Gillberg has been Professor of Child and Adolescent Psychiatry at the University of Gothenburg since the mid-1980s, where he has led the Gillberg Neuropsychiatry Centre since 2010. He is also a senior physician at the Sahlgrenska University Hospital, and he is one of the world's most experienced clinically active child and adolescent psychiatrists with more than 45 years of extensive clinical practice in the care of patients and families with complex psychiatric/developmental neurological problems.

Carmela Miniscalco is Professor of Speech and Language Pathology, adjunct at the Gillberg Neuropsychiatry Centre, University of Gothenburg. She has worked clinically with children with language disorders for more than 30 years. She is the author of some 55 scientific articles and a book chapter on language and communication difficulties and their relationship to neuropsychiatric disabilities. Her main interest in the clinical, research and teaching field is the development of language and communication and the occurrence of language disorders in children in different clinical groups, such as those with autism.

ORCID

Ulrika Schachinger-Lorentzon http://orcid.org/0000-0002-4751-9243
Emilia Carlsson http://orcid.org/0000-0003-2211-823X
Eva Billstedt http://orcid.org/0000-0002-4200-2149
Christopher Gillberg http://orcid.org/0000-0001-8848-1934
Carmela Miniscalco http://orcid.org/0000-0002-7488-8482

References

[1] Meier G, Conteh J. Conclusion: the multilingual turn in language education. The multilingual turn in languages education: Opportunities and challenges. Bristol: Multilingual Matters; 2014; p. 292–299.
[2] Rothman J, Bayram F, DeLuca V, et al. Monolingual comparative normativity in bilingualism research is out of "control": arguments and alternatives. Appl Psycholinguist. 2023;44(3):316–329. doi: 10.1017/S0142716422000315.
[3] Haywood HC, Tzuriel D. Applications and challenges in dynamic assessment. Peabody J Educ. 2002;77(2):40–63. doi: 10.1207/S15327930PJE7702_5.
[4] Paradis J, Nicoladis E, Crago M, et al. Bilingual children's acquisition of the past tense: a usage-based approach. J Child Lang. 2011;38(3):554–578. doi: 10.1017/S0305000910000218.
[5] Thordardottir E, Rothenberg A, Rivard M-E, et al. Bilingual assessment: can overall proficiency be estimated from separate measurement of two languages? J Multilingual Commun Disord. 2006;4(1):1–21. doi: 10.1080/14769670500215647.
[6] Salameh EK, Håkansson G, Nettelbladt U. Developmental perspectives on bilingual swedish-arabic children with and without language impairment: a longitudinal study. Int J Lang Commun Disord. 2004;39(1):65–90. doi: 10.1080/13682820310001595628.
[7] Thordardottir E, Brandeker M. The effect of bilingual exposure versus language impairment on nonword repetition and sentence imitation scores. J Commun Disord. 2013;46(1):1–16. doi: 10.1016/j.jcomdis.2012.08.002.
[8] Armon-Lotem S. 30 SLI in bilingual development: how do we approach assessment? Handbook of communication disorders. 2018; Vol. 5, p. 617–642.
[9] Paradis J, Jia R. Bilingual children's long-term outcomes in English as a second language: language environment factors shape individual differences in catching up with monolinguals. Dev Sci. 2017;20(1):e12433. doi: 10.1111/desc.12433.
[10] Andersson K, Hansson K, Rosqvist I, et al. The contribution of bilingualism, parental education, and school characteristics to performance on the clinical evaluation of language fundamentals: Swedish. Front Psychol. 2019;10:1586. doi: 10.3389/fpsyg.2019.01586.
[11] Law J, Charlton J, Asmussen K. Child language as a wellbeing indicator. 2017.
[12] Swedish National Agency for Education [webpage]. Www.skolverket.se: swedish national agency for education. 2023 [cited 2023 July 13]. Läroplan för förskolan LPÖ.
[13] Andreou G, Lemoni G. Narrative skills of monolingual and bilingual pre-school and primary school children with developmental language disorder (DLD): a systematic review. OJML. 2020;10(05):429–458. doi: 10.4236/ojml.2020.105026.
[14] Hambly H, Wren Y, McLeod S, et al. The influence of bilingualism on speech production: a systematic review. Int J Lang Commun Disord. 2013;48(1):1–24. doi: 10.1111/j.1460-6984.2012.00178.x.
[15] Salameh E-K, Nettelbladt U, Gullberg B. Risk factors for language impairment in Swedish bilingual and monolingual children relative to severity. Acta Paediatr. 2002;91(12):1379–1384. doi: 10.1111/j.1651-2227.2002.tb02837.x.
[16] Semel E, Wiig E, Secord W. Clinical evaluation of language fundamentals, (CELF-4), swedish version. Stockholm, Sweden: Pearson Assessment [Google Scholar]. 2013.
[17] Nayeb L, Wallby T, Westerlund M, et al. Child healthcare nurses believe that bilingual children show slower language development, simplify screening procedures and delay referrals. Acta Paediatr. 2015;104(2):198–205. doi: 10.1111/apa.12834.
[18] Sansavini A, Favilla ME, Guasti MT, et al. Developmental language disorder: early predictors, age for the diagnosis, and diagnostic tools. A scoping review. Brain Sci. 2021;11(5):654. doi: 10.3390/brainsci11050654.
[19] Tighe JM, Namazi M. SPICES: disclosure practices to help caregivers digest a diagnosis of developmental language disorder. Am J Speech Lang Pathol. 2022;31(5):1919–1932. doi: 10.1044/2022_AJSLP-21-00295.
[20] Rethfeldt WS, McNeilly L, Laasonen M, et al. Assessment of developmental language disorder in multilingual children: results from an international survey. Folia phoniatrica et logopaedica: Official Organ of the International Association of Logopedics and Phoniatrics (IALP). 2023.
[21] Laasonen M, Smolander S, Lahti-Nuuttila P, et al. Understanding developmental language disorder-the Helsinki longitudinal SLI study (HelSLI): a study protocol. BMC Psychol. 2018;6(1):24. doi: 10.1186/s40359-018-0222-7.
[22] Pennington BF, Bishop DV. Relations among speech, language, and reading disorders. Annu Rev Psychol. 2009;60(1):283–306. doi: 10.1146/annurev.psych.60.110707.163548.

[23] Vandewalle E, Boets B, Boons T, et al. Oral language and narrative skills in children with specific language impairment with and without literacy delay: a three-year longitudinal study. Res Dev Disabil. 2012;33(6):1857–1870. doi: 10.1016/j.ridd.2012.05.004.
[24] Marinopoulou M, Billstedt E, Lin PI, et al. Number of words at age 2.5 years is associated with intellectual functioning at age 7 years in the SELMA study. Acta Paediatr. 2021;110(7):2134–2141. doi: 10.1111/apa.15835.
[25] McLeod S, Verdon S, Baker E, et al. Tutorial: speech assessment for multilingual children who do not speak the same language (s) as the speech-language pathologist. Am J Speech Lang Pathol. 2017;26(3):691–708. doi: 10.1044/2017_AJSLP-15-0161.
[26] Tallal P, Ross R, Curtiss S. Familial aggregation in specific language impairment. J Speech Hear Disord. 1989;54(2):167–173. doi: 10.1044/jshd.5402.167.
[27] Boerma T, Blom E. Effects of developmental language disorder and bilingualism on children's executive functioning: a longitudinal study. Res Dev Disabil. 2020;107:103782. doi: 10.1016/j.ridd.2020.103782.
[28] Chiat S, Polišenská K. A framework for crosslinguistic nonword repetition tests: effects of bilingualism and socioeconomic status on children's performance. J Speech Lang Hear Res. 2016;59(5):1179–1189. doi: 10.1044/2016_JSLHR-L-15-0293.
[29] Boerma T, Blom E. Assessment of bilingual children: what if testing both languages is not possible? J Commun Disord. 2017;66:65–76. doi: 10.1016/j.jcomdis.2017.04.001.
[30] Schachinger-Lorentzon U, Kadesjö B, Gillberg C, et al. Children screening positive for language delay at 2.5 years: language disorder and developmental profiles. Neuropsychiatr Dis Treat. 2018;14:3267–3277. doi: 10.2147/NDT.S179055.
[31] Edwards S, Garman M, Hughes A, et al. Assessing the comprehension and production of language in young children: an account of the Reynell developmental language scales III. Int J Lang Commun Disord. 1999;34(2):151–171. doi: 10.1080/136828299247487.
[32] Norbury CF, Gooch D, Wray C, et al. The impact of nonverbal ability on prevalence and clinical presentation of language disorder: evidence from a population study. J Child Psychol Psychiatry. 2016;57(11):1247–1257. doi: 10.1111/jcpp.12573.
[33] Bishop D. Test for reception of grammar, version 2 (trog 2). Swedish version. London, UK: Pearson Assessment; 2009.
[34] Bruinsma G, Wijnen F, Gerrits E. Language gains in 4-6-year-old children with developmental language disorder and the relation with language profile, severity, multilingualism and non-verbal cognition. Int J Lang Commun Disord. 2023;58(3):765–785. doi: 10.1111/1460-6984.12821.
[35] Dunn LM, Dunn DM. PPVT-4: peabody picture vocabulary test. Pearson Assessments; 2007.
[36] Vang Christensen R. Sentence repetition: a clinical marker for developmental language disorder in Danish. J Speech Lang Hear Res. 2019;62(12):4450–4463. doi: 10.1044/2019_JSLHR-L-18-0327.
[37] Taha J, Stojanovik V, Pagnamenta E. Sentence repetition as a clinical marker of developmental language disorder: evidence from arabic. J Speech Lang Hear Res. 2021;64(12):4876–4899. doi: 10.1044/2021_JSLHR-21-00244.
[38] Holmberg E, Sahlén B. Nya nelli—neurolingvistisk undersökning för barn med språkstörningar. Pedagogisk Design, Malmö; 2001.
[39] Renfrew CE. Word finding vocabulary test. 4th ed. Bicester: Speechmark Publishing; 1995.
[40] Petersen D, Spencer TD. Narrative assessment and intervention: a clinical tutorial on extending explicit language instruction and progress monitoring to all students. Perspect Comm Dis Sci CLD Pop. 2014;21(1):5–21. doi: 10.1044/cds21.1.5.
[41] Renfrew C. Renfrew bus story manual: a test of narrative speech. Oxford, United Kingdom: Renfrew/Winslow; 1995.
[42] Favot K, Carter M, Stephenson J. The effects of oral narrative intervention on the narratives of children with language disorder: a systematic literature review. J Dev Phys Disabil. 2021;33(4):489–536. doi: 10.1007/s10882-020-09763-9.
[43] Bliss LS, McCabe A, Miranda AE. Narrative assessment profile: discourse analysis for school-age children. J Commun Disord. 1998;31(4):347–362; quiz 363. doi: 10.1016/s0021-9924(98)00009-4.
[44] Wechsler D, Naglieri JA. Wechsler nonverbal scale of ability: WNV. San Antonio, TX: Harcourt Assessment; 2006.
[45] Nettelbladt U, Salameh E-K. Språkutveckling och språkstörning hos barn. D. 1, Fonologi, grammatik, lexikon. Studentlitteratur AB; 2007.
[46] Hoff E, Rumiche R, Burridge A, et al. Expressive vocabulary development in children from bilingual and monolingual homes: a longitudinal study from two to four years. Early Child Res Q. 2014;29(4):433–444. doi: 10.1016/j.ecresq.2014.04.012.
[47] Marinis T, Chondrogianni V. Comprehension of reflexives and pronouns in sequential bilingual children: do they pattern similarly to L1 children, L2 adults, or children with specific language impairment? J Neurolinguistics. 2011;24(2):202–212. doi: 10.1016/j.jneuroling.2010.02.009.
[48] Hoff E. Bilingual development in children of immigrant families. Child Dev Perspect. 2018;12(2):80–86. doi: 10.1111/cdep.12262.
[49] Adesope OO, Lavin T, Thompson T, et al. A systematic review and meta-analysis of the cognitive correlates of bilingualism. Rev Educ Res. 2010;80(2):207–245. doi: 10.3102/0034654310368803.
[50] Farabolini G, Rinaldi P, Caselli MC, et al. Non-word repetition in bilingual children: the role of language exposure, vocabulary scores and environmental factors. Speech Lang Hear. 2021;25(3):283–298. doi: 10.1080/2050571X.2021.1879609.
[51] Meir N, Armon-Lotem S. Independent and combined effects of socioeconomic status (SES) and bilingualism on children's vocabulary and verbal short-term memory. Front Psychol. 2017;8:1442. doi: 10.3389/fpsyg.2017.01442.
[52] Boudreau D. Narrative abilities: advances in research and implications for clinical practice. Topic Lang Disord. 2008;28(2):99–114. doi: 10.1097/01.TLD.0000318932.08807.da.
[53] Duinmeijer I, de Jong J, Scheper A. Narrative abilities, memory and attention in children with a specific language impairment. Int J Lang Commun Disord. 2012;47(5):542–555. doi: 10.1111/j.1460-6984.2012.00164.x.
[54] Merritt DD, Liles BZ. Narrative analysis: clinical applications of story generation and story retelling. J Speech Hear Disord. 1989;54(3):438–447. doi: 10.1044/jshd.5403.438.
[55] Tonér S, Gerholm TN. Links between language and executive functions in Swedish preschool children: a pilot study. Appl Psycholinguist. 2021;42(1):207–241. doi: 10.1017/S0142716420000703.
[56] Statistics Sweden. Educational attainment of the population in 2018 scb.se: statistics Sweden; 2018 [cited 2023 April 15]. Available from https://www.scb.se/en/finding-statistics/statistics-by-subject-area/education-and-research/education-of-the-population/educational-attainment-of-the-population/pong/statistical-news/namnlos/
[57] Bishop DVM, Edmundson A. Language-impaired 4-year-olds: distinguishing transient from persistent impairment. J Speech Hear Disord. 1987;52(2):156–173. doi: 10.1044/jshd.5202.156.
[58] Henrichs J, Rescorla L, Schenk JJ, et al. Examining continuity of early expressive vocabulary development: the generation R study. 2011.
[59] Zambrana IM, Pons F, Eadie P, et al. Trajectories of language delay from age 3 to 5: persistence, recovery and late onset. Int J Lang Commun Disord. 2014;49(3):304–316. doi: 10.1111/1460-6984.12073.
[60] Sandberg E, Larsson A, Miniscalco C. Språkscreening vid 2 ½ års ålder på barnavårdscentralen. Hämtad; 2019.
[61] Pham G, Kohnert K. Sentence interpretation by typically developing Vietnamese–English bilingual children. Appl Psycholinguist. 2010;31(3):507–529. doi: 10.1017/S0142716410000093.