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Developmental Trajectory of Language From 2 to 13 Years in Children Born Very Preterm

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abstract

OBJECTIVES: The objective of this study was to describe language functioning at 13 years of age and examine its developmental trajectory from 2 to 13 years of age in children born very preterm (VP) compared with term controls.

METHODS: Two hundred and twenty-four children born VP (<30 weeks' gestation) and 77 term controls had language skills assessed by using performance-based and/or parent-report measures at 2, 5, 7, and 13 years of age. Regression models were used to compare verbal memory, grammar, semantics, and pragmatic skills between the VP and term groups at 13 years of age. Linear mixed effects regression models were used to assess language trajectories from 2 to 13 years of age.

RESULTS: Compared with term controls, children born VP had poorer functioning across all components of language (mean group differences ranged from −0.5 SD to −1 SD; all $P < .05$) at 13 years of age. At each follow-up age, the VP group displayed poorer language functioning than the term controls, with the groups exhibiting similar developmental trajectories (slope difference = −0.01 SD per year; $P = .55$).

CONCLUSIONS: Children born VP continue to display language difficulties compared with term controls at 13 years of age, with no evidence of developmental "catch-up." Given the functional implications associated with language deficits, early language-based interventions should be considered for children born VP.

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Ms Nguyen collected data, conducted initial analyses, drafted the initial manuscript, and revised the manuscript; Profs Anderson, Doyle, and Inder, Associate Profs Cheong and Thompson, and Dr Spencer-Smith conceptualized and designed the study and critically reviewed and revised the manuscript; Drs Ellis and Scratch coordinated and supervised data collection and reviewed the manuscript; Ms Zannino planned and assisted in statistical analyses and reviewed and revised the manuscript; Dr Burnett revised statistical analyses and critically reviewed the manuscript; Ms Pascoe collected data and reviewed and revised the manuscript; and all authors approved the final manuscript as submitted.

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WHAT'S KNOWN ON THIS SUBJECT: Children born very preterm (VP) have poorer language functioning compared with term controls in early to middle childhood, but few researchers have conducted studies extending into late childhood or examined developmental trajectories.

WHAT THIS STUDY ADDS: Children born VP experience generalized language deficits at 13 years of age compared with term controls. The developmental trajectory from 2 to 13 years of age reveals that language functioning is consistently reduced in children born VP.

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Language is a multifaceted and complex neurodevelopmental domain that has important implications for functional outcomes such as academic achievement and social interactions.[1,2] In studies of children born very preterm (VP) (<30 weeks' gestation), language functioning can be dichotomized as expressive and receptive language and is most commonly conceptualized as comprising separate yet interdependent components of phonology, grammar, semantics, and pragmatics.[3] Children born VP display poorer skills across a range of language components, including receptive and expressive language, in early and middle childhood compared with their peers born term (>37 weeks' gestation).[4–8] We recently reported that, at 7 years of age, children born VP had worse performance across several language components compared with term controls, including phonological awareness, semantics, grammar, discourse, and pragmatics.[9] The authors of a few studies have examined language functioning in children born VP beyond middle childhood.[10–12] In a well-characterized US cohort of children born VP who were 12 to 16 years old, the VP group had poorer performance than the term controls on syntax and semantics, but not on receptive vocabulary and phonological awareness.[10,11] Although language difficulties present in the early years might persist into later childhood, more research is needed to understand language functioning in children born VP beyond middle childhood.

Longitudinal studies are needed to understand the trajectory of language development in children born VP compared with their peers born term, in part to determine if there is a need for intervention.[13] The authors of the 2 existing longitudinal studies provide conflicting results. Recently, Putnick et al[14] reported that overall language ability was stable between 4 and 8 years of age in children born VP, indicating that they were unlikely to "catch up" to the level of children born term. In contrast, Luu et al[11] reported that the gap in receptive vocabulary skills of children born VP compared with term controls narrowed from 8 to 16 years of age. It remains unclear whether early poor language skills can be considered a delay and whether catch-up is expected, or if it is a persistent deficit.

To address gaps in the current literature, the first aim of this study was to examine language functioning in a cohort of children born VP compared with term controls in late childhood. It was expected that children born VP would show reduced performance across a range of language measures compared with term controls. The second aim was to go beyond cross-sectional comparisons[13] and examine the developmental trajectory of language functioning in children born VP compared with term controls from the age of 2 to 13 years.

METHODS

Participants

Participants were part of the Victorian Infant Brain Study, which included a prospective longitudinal cohort of children born VP and term controls. The VP cohort comprised 227 infants born VP (<30 weeks' gestation) and/or with very low birth weight (<1250 g) who were recruited at birth between July 2001 and December 2003 from The Royal Women's Hospital in Melbourne, Australia. Infants with genetic or congenital abnormalities associated with adverse neurologic outcomes and non-English–speaking parents were ineligible. Two infants subsequently died, and 1 child was later diagnosed with a congenital disorder, resulting in a living cohort of 224 infants born VP. The term control group comprised 77 infants born at >37 to ≤41 weeks' gestation: 46 recruited at birth from Melbourne's The Royal Women's Hospital and 31 recruited at 2 years of age from the community to match the sociodemographics of the VP cohort. The study was approved by the Human Research and Ethics Committees of The Royal Women's Hospital and The Royal Children's Hospital, Melbourne. Parents gave written informed consent for their children to participate.

Procedure

Children had neurodevelopmental assessments at 2, 5, 7, and 13 years of age, which were corrected for prematurity (Supplemental Fig 2). Corrected age is commonly used in research studies of children born VP to account for known biases on cognitive tests, even in late childhood.[15,16] Language functioning was assessed as part of a larger neuropsychological test battery at each follow-up. Assessors were blinded to a child's group membership (VP or term) and previous assessment scores.

Two-Year Follow-up

Language functioning was estimated by using the parent-reported Communication and Symbolic Behavior Scales Developmental Profile, a standardized tool for evaluating early functional communication skills in children aged 6 to 24 months.[17] Social and Speech composite scores (mean = 10, SD = 3) were combined to provide a summary score of language ability.

Social risk was assessed by using a demographic questionnaire, which was used to collect information on 6 social factors associated with child development (family structure, primary caregiver education, primary income earner employment and occupation, language spoken at home, and maternal age at birth).[18–20] Each factor was scored from 0 to

2 and totaled to give an overall score from 0 to 12. Scores ≥2 were considered to indicate higher social risk.

Five-Year Follow-up

Language functioning was estimated by using an overall sum of the Receptive and Expressive Language composite scores (mean = 100, SD = 15) from the Kaufman Survey of Early Academic and Language Skills, an individually administered measure of children's school readiness and language skills that is normed for children aged 3 to 6 years.[21]

Seven-Year Follow-up

Language functioning was assessed by using the Core Language Index (mean = 100, SD = 15) of the Clinical Evaluation of Language Fundamentals, Fourth Edition (CELF-4) designed for children aged 5 to 21 years.[22]

Thirteen-Year Follow-up

The Core Language Index from the CELF-4 was also used to assess overall language functioning at 13 years of age, generated from the 4 core subtests that are used to assess verbal memory, grammar, semantics, and expressive vocabulary.

Pragmatic skills were estimated by using the parent-reported Children's Communication Checklist, Second Edition (CCC-2), which is normed for children aged 4 to 16 years and consists of 70 items divided into 10 subscales: speech, syntax, semantics, coherence, inappropriate initiation, stereotyped language, use of context, nonverbal communication, social relations, and interests.[23] The scaled scores from the first 8 subscales (mean = 10, SD = 3) are summed to derive the General Communication Composite (GCC), which is used to distinguish children with communication difficulties from typically developing children. In addition, a Pragmatics Composite (PC)[24–26] can be calculated to estimate pragmatic aspects of language that are not readily assessed by conventional language assessment tools, by summing the scaled scores of 5 subscales: coherence, inappropriate initiation, stereotyped language, use of context, and nonverbal communication.

General cognitive function (IQ) was estimated by using the Kaufman Brief Intelligence Test, Second Edition (mean = 100, SD = 15).[27]

Statistical Analysis

Linear regression was used to compare mean differences in language functioning between VP children and term controls at 13 years of age (Aim 1). Regression models were fitted by using generalized estimating equations with an exchangeable correlation structure to allow for the clustering of multiple births in the study, and results were reported with robust (sandwich) estimators of SE. Social risk was entered as a covariate in adjusted analyses. A sensitivity analysis was conducted excluding children who had hearing loss (VP n = 8; term n = 1), spoke languages other than English at home (VP n = 18; term n = 7), and/or experienced significant developmental delay at 13 years of age (defined as a composite IQ <70 and/or a diagnosis of severe cerebral palsy; VP n = 12). Some children were excluded for multiple reasons. The proportion of children who were considered language impaired, defined as scoring below −1.25 SD of the CELF-4 test mean,[28] less than or equal to the fifth percentile for the individual CCC-2 subscales,[23] ≤10th percentile (standard score of 45 according to Australian norms) for the GCC,[23] and in the impaired range on at least 2 subscales of the PC,[29] were compared between the VP and term groups by using logistic regression.

Linear mixed effects regression was used to examine the trajectory of language development in the VP group compared with term controls across the ages of 2, 5, 7, and 13 years, and age was included as a continuous variable (Aim 2). Children who could not complete the CELF-4 language assessment because of disability, reduced comprehension, or behavioral difficulties were given a standard score of 0 at the ages of 7 (VP n = 8)[9] and 13 years (VP n = 4). A z score was calculated for overall language functioning at each follow-up and used as the outcome, with the group (VP or term) included as a predictor, and a random intercept and age effect to allow for clustering of observations within a child. An interaction term was included in the mixed model to determine if the effect of age on overall language functioning differed according to group. Analyses were conducted by using Stata 13.0 (StataCorp, College Station, TX).

RESULTS

At the 13-year follow-up, 179 children born VP (80%) and 61 term controls (80%) were assessed. The sample characteristics of children who participated in the 13-year follow-up are reported in Table 1. Compared with 11 term controls, 55 children born VP had a history of receiving allied health services, with 27 children born VP receiving allied health support at the time of the 13-year follow-up. Speech pathology services were accessed by 34 children (VP n = 29; term n = 5), with 13 children (VP n = 11; term n = 2) receiving speech therapy at the 13-year follow-up (Supplemental Table 4).

Language Outcome at the Age of 13 Years

As expected, children born VP performed more poorly than term controls on all language components assessed, with group differences ranging from 0.5 to 1.0 SD (Table 2). After controlling for social risk,

TABLE 1 Study Sample Characteristics

Characteristic	VP	Term
	(n = 179)	(n = 61)
Neonatal		
Gestational age, wk, mean (SD)	27.4 (1.9)	39.1 (1.3)
Birth wt, g, mean (SD)	962 (225)	3305 (524)
Male sex, *n* (%)	92 (51)	25 (41)
Multiple birth, *n* (%)	80 (45)	4 (7)
SGA[a], *n* (%)	15 (8)	1 (3)
BPD[a], *n* (%)	63 (35)	0
Sepsis[a], *n* (%)	60 (34)	0
Postnatal corticosteroids[a], *n* (%)	17 (10)	0
Grade III or IV IVH[a], *n* (%)	8 (4)	0
Cystic PVL[a], *n* (%)	7 (4)	0
13-y follow-up		
Age (y) at assessment, mean (SD)	13.3 (0.4)	13.2 (0.5)
Receiving speech therapy, *n* (%)	11 (6)	2 (3)
Receiving allied health services[b], *n* (%)	27 (15)	0
KBIT IQ < 70, *n* (%)	12 (7)	0
ADHD[c], *n* (%)	18 (10)	2 (3)
ASD[c], *n* (%)	8 (5)	0
Severe cerebral palsy[c], *n* (%)	2 (1)	0
Sociodemographic		
Social risk, high, at 2 y[a], *n* (%)	95 (58)	19 (32)

ADHD, attention-deficit/hyperactivity disorder; ASD, autism spectrum disorder; BPD, bronchopulmonary dysplasia; IVH, intraventricular hemorrhage; KBIT, Kaufman Brief Intelligence Test; PVL, periventricular leukomalacia; SGA, small for gestational age.

[a] Some group sizes differ because of missing data.

[b] Allied health service is defined as currently receiving psychological services, occupational therapy, and/or physiotherapy.

[c] Cerebral palsy and psychiatric diagnoses are drawn from the 7-y follow-up.

adjusted mean differences were slightly reduced but remained lower in the VP group compared with term children, as was the case for the sensitivity analysis.

Across most language domains, a higher proportion of children born VP had an impairment compared with term controls, and odds ratios ranged from 2.1 to 8.1 (Table 3). Impairment rates in the VP group were particularly elevated for expressive language measures. Similarly, a higher proportion of children born VP (45%) had an impairment on at least 1 language measure compared with term controls (18%; odds ratio = 4.0; 95% confidence interval [CI] = 1.9 to 8.5; $P < .001$).

Trajectory of Language Development

Across the ages of 2, 5, 7, and 13 years, the VP group showed lower language functioning compared with term controls (overall mean difference = −0.7 SD; 95% CI = −0.9 to −0.5 SD; $P < .001$), with little evidence that the average level of language function varied with age (slope = −0.06; 95% CI = −0.2 to 0.01 SD per year; $P = .29$). There was little evidence that the trajectory of language development varied by group (slope difference = −0.01 SD per year; 95% CI = −0.04 to 0.02; interaction $P = .55$; Fig 1), and this finding did not change when the analysis was adjusted for social risk (interaction $P = .49$) or in the sensitivity analysis that excluded children with hearing loss or English as a second language and/or who experienced significant developmental delay (interaction $P = .48$).

DISCUSSION

This study revealed that language deficits are an ongoing concern for children born VP, with marked and generalized deficits observed at the age of 13 years. Consistent with this finding, our longitudinal trajectory analyses revealed no evidence of developmental catch-up for the VP group, with children born VP displaying persistent language difficulties compared with term controls between the ages of 2 and 13 years. Our findings were robust, remaining largely unaltered after adjusting for social risk and excluding children with hearing loss, English as a second language, intellectual impairment, or severe cerebral palsy.

Our VP cohort had elevated rates of language impairment compared with term controls, with rates similar to those reported in previous studies of younger VP samples.[2,4,8,9] Impairments were observed across all language components assessed at 13 years of age in children born VP, reflective of a generalized language impairment rather than selective deficits (eg, pragmatic impairment). This is consistent with the findings of our earlier study of language in the same cohort, in which children born VP displayed impairments in phonology, grammar, semantics, discourse, and pragmatics at 7 years of age,[9] as well as with a meta-analysis whose authors reported poorer receptive and expressive semantics in school-aged children.[30] In contrast, Luu et al[10] reported selective difficulties in syntactic and semantic language skills in a cohort of 12-year-old children born with very low birth weight, who showed comparable phonological processing skills compared with term controls. Although difficulties across the language components suggested a generalized language deficit, it should be noted that there was an increased risk for impairments for expressive language skills in the VP group.

Language develops as a series of hierarchically organized abilities, with later higher-order functions incorporating and building on earlier skills.[31] Therefore, long-term longitudinal studies whose authors examine language extending into

TABLE 2 Language Outcomes at 13 Years of Age for Children Born VP Compared With Term Controls

Language Measure	VP	Term	Unadjusted		Adjusted[a]	
	Mean (SD)	Mean (SD)	MD (95% CI)	*P*	MD (95% CI)	*P*
Whole sample						
CELF-4	*n* = 179	*n* = 61				
Verbal memory	8.8 (3.3)	10.2 (2.7)	−1.4 (−2.3 to −0.6)	.001	−1.2 (−2.1 to −0.3)	.01
Grammar	8.9 (3.4)	10.4 (2.0)	−1.5 (−2.3 to −0.8)	<.001	−1.3 (−2.1 to −0.4)	.002
Semantics, receptive	9.3 (3.4)	11.5 (2.2)	−2.2 (−3.0 to −1.4)	<.001	−2.0 (−2.8 to −1.2)	<.001
Semantics, expressive	9.9 (3.6)	11.9 (2.4)	−1.9 (−2.7 to −1.1)	<.001	−1.7 (−2.6 to −0.8)	<.001
Semantics, total	9.6 (3.6)	11.8 (2.3)	−2.2 (−3.0 to −1.4)	<.001	−2.0 (−2.9 to −1.1)	<.001
Expressive vocabulary	10.9 (3.7)	12.8 (2.3)	−1.8 (−2.7 to −1.0)	<.001	−1.6 (−2.4 to −0.7)	<.001
Core language index	97.9 (19.8)	108.7 (11.6)	−10.9 (−15.3 to −6.4)	<.001	−9.3 (−14.1 to −4.5)	<.001
CCC-2	*n* = 164[b]	*n* = 58[b]				
Coherence	8.1 (3.6)	9.5 (3.0)	−1.7 (−2.7 to −0.7)	.001	−1.7 (−2.7 to −0.6)	.002
Inappropriate initiation	8.7 (3.8)	9.8 (3.1)	−1.6 (−2.6 to −0.5)	.003	−1.1 (−2.2 to 0.0)	.04
Stereotyped language	8.6 (3.5)	10.1 (2.8)	−1.9 (−2.9 to −1.0)	<.001	−1.7 (−2.6 to −0.7)	.001
Use of context	7.4 (3.9)	9.6 (3.3)	−2.5 (−3.6 to −1.4)	<.001	−2.3 (−3.4 to −1.2)	<.001
Nonverbal communication	8.1 (3.6)	9.4 (3.0)	−1.5 (−2.5 to −0.5)	.003	−1.4 (−2.3 to −0.4)	.006
PC	40.9 (16.2)	48.4 (13.0)	−9.5 (−13.9 to −5.0)	<.001	−8.4 (−12.8 to −3.9)	<.001
GCC	65.5 (24.9)	77.1 (19.8)	−14.8 (−21.5 to −8.1)	<.001	−13.4 (−20.1 to −6.8)	<.001
Sensitivity analysis (excludes children with significant developmental impairment, deafness, or English as second language)						
CELF-4	*n* = 143[b]	*n* = 54[b]				
Verbal memory	9.1 (3.0)	10.2 (2.8)	−1.1 (−1.9 to −0.1)	.02	−0.9 (−1.8 to 0.1)	.08
Grammar	9.3 (3.0)	10.3 (2.1)	−1.0 (−1.8 to −0.3)	.009	−0.8 (−1.7 to 0.0)	.06
Semantics, receptive	9.6 (3.1)	11.4 (2.3)	−1.9 (−2.7 to −1.0)	<.001	−1.7 (−2.6 to −0.8)	<.001
Semantics, expressive	10.3 (3.3)	11.8 (2.5)	−1.5 (−2.3 to −0.6)	.001	−1.3 (−2.3 to −0.4)	.004
Semantics, total	9.9 (3.3)	11.7 (2.4)	−1.8 (−2.7 to −0.9)	<.001	−1.7 (−2.6 to −0.8)	<.001
Expressive vocabulary	11.3 (3.4)	12.7 (2.3)	−1.4 (−2.3 to −0.6)	.001	−1.2 (−2.1 to −0.3)	.007
Core language index	100.3 (17.2)	108.3 (11.9)	−8.0 (−12.6 to −3.5)	.001	−6.7 (−11.5 to −1.8)	.007
CCC-2	*n* = 110[b]	*n* = 51[b]				
Coherence	8.3 (3.6)	9.6 (2.9)	−1.5 (−2.6 to −0.4)	.006	−1.5 (−2.5 to −0.4)	.008
Inappropriate initiation	8.9 (4.0)	9.8 (3.0)	−1.4 (−2.5 to −0.2)	.02	−0.9 (−2.0 to −0.3)	.14
Stereotyped language	8.8 (3.4)	10.1 (2.8)	−1.7 (−2.7 to −0.7)	.001	−1.5 (−2.5 to −0.5)	.003
Use of context	7.7 (3.9)	9.6 (3.2)	−2.2 (−3.4 to −1.0)	<.001	−2.0 (−3.2 to −0.9)	.001
Nonverbal communication	8.2 (3.7)	9.3 (3.0)	−1.3 (−2.4 to −0.2)	.02	−1.2 (−2.2 to −0.1)	.03
PC	42.0 (16.3)	48.3 (12.7)	−8.4 (−13.2 to −3.6)	.001	−7.4 (−12.0 to −2.7)	.002
GCC	67.6 (24.3)	76.7 (19.7)	−12.5 (−19.8 to −5.3)	.001	−11.3 (−18.2 to −4.4)	.001

MD, mean difference.

[a] Adjusted for social risk.

[b] Sample numbers differ because of missing data.

TABLE 3 Rates of Language Impairment at 13 Years of Age for Children Born VP Compared With Term Controls

Language Component	VP	Term	Odds Ratio (95% CI)	*P*
CELF-4	*n* = 179	*n* = 61		
Verbal memory, *n* (%)	24 (13)	3 (5)	2.9 (0.8 to 10.1)	.07
Grammar, *n* (%)	19 (11)	2 (3)	3.4 (0.8 to 15.4)	.09
Semantics, receptive, *n* (%)	23 (13)	0	N/A[a]	.003
Semantics, expressive, *n* (%)	32 (18)	2 (3)	6.4 (1.5 to 27.9)	.005
Semantics, total, *n* (%)	24 (13)	0	N/A[a]	.002
Expressive vocabulary, *n* (%)	23 (13)	1 (2)	8.1 (1.1 to 62.2)	.01
Core language index, *n* (%)	18 (10)	2 (3)	3.1 (0.7 to 14.2)	.10
CCC-2	*n* = 164[b]	*n* = 58[b]		
Coherence	24 (18)	3 (5)	4.6 (1.3 to 16.2)	.02
Inappropriate initiation	33 (24)	6 (10)	3.5 (1.3 to 9.5)	.03
Stereotyped language	18 (13)	4 (7)	2.1 (0.7 to 6.3)	.20
Use of context	45 (33)	7 (12)	4.6 (1.8 to 11.7)	.002
Nonverbal communication	23 (17)	3 (5)	3.9 (1.1 to 13.4)	.03
PC, *n* (%)	36 (28)	8 (14)	3.0 (1.2 to 7.2)	.04
GCC, *n* (%)	34 (25)	6 (10)	4.2 (1.5 to 11.6)	.02

Language impairment is defined as scoring below −1.25 SD of the CELF-4 test mean, less than or equal to the fifth percentile for CCC-2 subscales, ≤10th percentile (standard score = 45) for the GCC, and in the impaired range on ≥2 subscales of the PC. N/A, not applicable.
[a] Odds ratio not calculated because of a value of 0 cases in 1 of the groups.
[b] Group numbers differ across variables because of missing data.

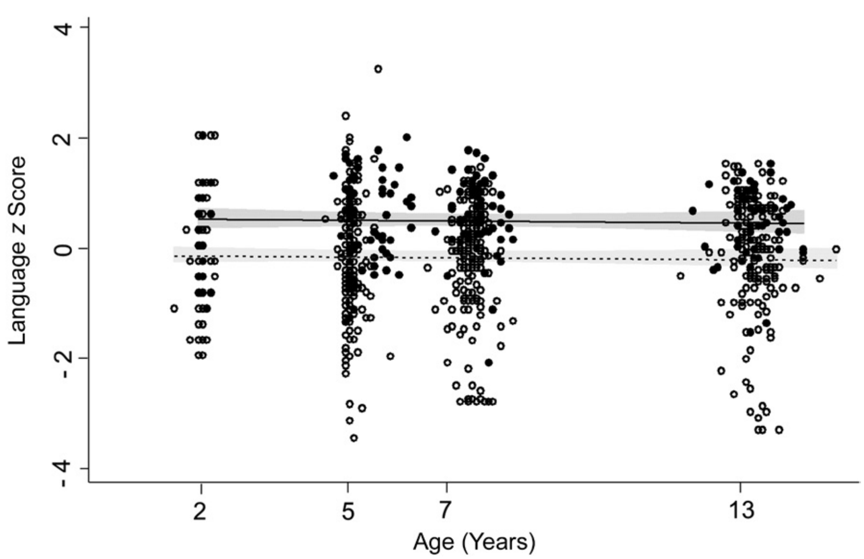

FIGURE 1
Language outcomes from 2 to 13 years of age for children born VP (open circles) and term controls (solid circles). The regression line of best fit is dotted for the VP group and solid for term controls. Shadows represent 95% CIs.

the adolescent years are needed to determine the long-term trajectory of language development in children born VP. In our study, we provide important insight into the development of language in children born VP, with poorer language functioning and almost identical developmental slopes compared with term controls from 2 to 13 years of age. Our findings are supported by a recent longitudinal study of children born VP from infancy to early school age that revealed consistently lower language functioning.[14] However, the authors of a meta-analysis reported an increase in difficulties on core language tests in children born preterm from 3 to 12 years of age,[30] whereas Luu et al[11,12] reported an improvement in receptive vocabulary skills in children born VP from 3 to 12 and 8 to 16 years of age. These mixed findings may be explained by methodological differences, such as study design, use of term control groups or normative comparisons, and language measures used. It is important to note that significant interindividual variability is observed in language outcomes of children born VP, and further research is needed to examine this heterogeneity.

Persisting language difficulties in our VP cohort across childhood highlights the importance of long-term follow-up, including language function. Language functioning has an important role in the development of social competencies, such as social interaction and peer relations[32] and healthy internalizing and externalizing behaviors.[33] Academic achievement, including reading, writing, and mathematics, has also been associated with language skills in VP samples.[34,35]
As such, research focused on intervention strategies for children born VP aimed at improving early language development is needed. The majority of targeted language intervention strategies focused on promoting parental awareness and interaction and improving specific aspects of children's language and communication skills have

resulted in encouraging outcomes, including improvements in expressive vocabulary and syntactic and phonological development.[36,37] However, evidence from controlled trials remains limited,[38] and the efficacy of early language interventions for children born VP remains a topic for future research. Early identification of children at risk for ongoing language problems and in most need of early intervention is important, yet at this stage, the factors contributing to language impairment in children born VP are poorly understood.

The strengths of this study were that we assessed multiple components of language in a large cohort of children born VP, used a control group, and explored the developmental trajectory of general language functioning from 2 to 13 years of age. As is inherent in developmental longitudinal studies, different language assessment tools were administered at the different follow-up waves. However, all tools are valid measures of language functioning and performance was based on our term control group's distribution rather than on different test norms. We acknowledge that our developmental trajectory results are limited to overall language functioning, and we were unable to explore the development of specific language domains. Data regarding the influence of familial dispositions for childhood language deficits were not collected. As such, this will be an important avenue for future research because it may provide a richer understanding of genetically based factors useful for identifying children who would benefit most from early support.

CONCLUSIONS

Difficulties in language functioning in this cohort of children born VP remained stable from 2 to 13 years of age. Although generalized language deficits were observed, the VP group had marked difficulties on expressive components of language. With our findings, we emphasize the need for effective and timely interventions for language skills in children born VP to close the gap with their term peers.

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ABBREVIATIONS

CCC-2: Children's Communication Checklist, Second Edition
CELF-4: Clinical Evaluation of Language Fundamentals, Fourth Edition
CI: confidence interval
GCC: General Communication Composite
PC: Pragmatics Composite
VP: very preterm

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