

## RESEARCH REPORT

# Children's speech, language and communication skills and parental knowledge in the growing up in New Zealand cohort

Catherine Mulderry | Bianca N. Jackson  | Suzanne Carolyn Purdy

School of Psychology, University of Auckland, Auckland, New Zealand

**Correspondence**

Bianca N. Jackson, School of Psychology, University of Auckland, Auckland, New Zealand.

Email: [bianca.jackson@auckland.ac.nz](mailto:bianca.jackson@auckland.ac.nz)

**Abstract**

**Introduction:** There is a substantial discrepancy between international and local prevalence rates for speech, language and communication needs (SLCN) amongst children in New Zealand. Reports of communication impairment are likely to be underestimates. Prevalence data can describe population characteristics and inform the scope and nature of services to adequately meet demand. Parents and other caregivers are central to the early identification of children with communication needs but they may not recognise their child's needs or act on their concerns.

**Method:** Cross-sectional data were available for the Growing Up in New Zealand (GUiNZ) longitudinal study cohort at 24, 54 and 72 months of age, with 76% of whānau (families;  $n = 5241$ ) completing three data waves. Descriptive and chi-square analyses were used to address: (1) What are the communication abilities of children in the first 5 years of life? (2) What do New Zealand parents understand of their children's communication? (3) Do New Zealand parents have concerns? (4) What are the trajectories of parental concern for children's communication in the first 6 years of life?

**Results:** At 24 months old, 16% of children had communication skills that were of concern to their parents. At 54 months, there were concerns for 12.6% of children. Although most parents were able to describe their child's expressive abilities, many parents remained unconcerned when their child demonstrated communication skills that did not meet developmental expectations.

**Conclusion:** Parents can offer valuable insights about their children, but in many cases their level of concern about SLCN did not align with a professional view which reflects a more nuanced understanding of children's speech and language and the impact on future communication skills and needs. Increased awareness through public health messaging specifically regarding lifelong

This is an open access article under the terms of the [Creative Commons Attribution-NonCommercial-NoDerivs](https://creativecommons.org/licenses/by-nc-nd/4.0/) License, which permits use and distribution in any medium, provided the original work is properly cited, the use is non-commercial and no modifications or adaptations are made.

© 2024 The Authors. *International Journal of Language & Communication Disorders* published by John Wiley & Sons Ltd on behalf of Royal College of Speech and Language Therapists.



influences of communication challenges will aid in prevention, early detection and intervention.

#### KEYWORDS

children, intelligibility, language development, parent report, prevalence, public health

#### WHAT THIS PAPER ADDS

*What is already known on this subject*

- Parent's expectations of child speech and language development will inform how responsive they are to difficulties in their child. Appropriate parental concern is key to recognition of children with speech, language and communication needs that warrant referral to a professional.

*What this paper adds to existing knowledge*

- Parents are aware of expressive language skills that children acquire and can accurately identify their children's skills but have less knowledge of the ages of acquisition. Some parents are not concerned, do not seek support despite recognisable difficulties, and demonstrate limited understanding of the future consequences for children with communication needs that are unmet.

*What are the potential or actual clinical implications of this work?*

- Public health messaging should include both skills and age ranges for speech and language acquisition. Additionally, educating the public of the impact of speech, language and communication skills on children's futures is needed.

## INTRODUCTION

Children with speech, language and communication needs (SLCNs) in Aotearoa New Zealand may not be accurately represented in current estimates due to the way disability is typically understood and assessed (Wylie et al., 2014). The NZ Disability Survey (Statistics New Zealand, 2014) reported that *having difficulty speaking and being understood due to a long-term condition* affected 3% of the population and identified speaking as one of three most common impairments for children. Since the characteristics of speech and language impairments are highly specific, vary in nature and severity between individuals, and can arise without an overarching medical condition, the NZ Disability Survey statistics do little to help us understand the extent of SLCN in preschool and school-aged children in New Zealand. In this study, we use the term SLCN to include all children who have any kind of SLCN, regardless of aetiology. Prevalence data allow health professionals to ascertain population characteristics and inform the scope and nature of services to adequately meet demand. The lack of comprehensive estimates may be increasing social inequities in New Zealand (Short et al., 2019).

Parents and other caregivers are central to the early identification of children with communication needs through accessing and participating in health services, but they may not have the knowledge or support to recognise their child's needs or act on their concerns (McGregor, 2020). International data suggest speech-language therapy (SLT) services may reach less than half of children in need in the early years (Skeat et al., 2014). Children with SLCNs can respond positively to timely, well-chosen intervention delivered at the right dose (Ebbels et al., 2019; Law et al., 2015); however, Australian research demonstrates that parents do not always access SLT services when concerned (McAllister et al., 2011). Given the emphasis on communicative and cognitive skills in modern economies (Wylie et al., 2014), the exact nature and prevalence of SLCNs requires further investigation to ensure that children with communication difficulties have equitable opportunities for participation. Parent expectations of speech and language development may inform how responsive they are to speech and language difficulties in their child (Rannard et al., 2005). Since parent advocacy has a significant role in the referral and intervention process (Davies et al., 2017), appropriate parental concern is

key to recognition of children with SLCNs that warrant referral.

The prevalence and nature of speech, language and communication abilities in paediatric populations in New Zealand have been largely excluded from estimates of disability. Although speaking was identified as a significant area of difficulty for children under 14 years old in the NZ Disability Survey (Statistics New Zealand, 2014), these statistics are far from comprehensive and do not discriminate between needs of primary school age children and college students. Also, since difficulty speaking can arise from both speech sound and language disorders, the survey results do little to illuminate the nature of communication difficulties among children with speech and language needs. Concerningly, compared to international prevalence rates the estimate of 3% is strikingly low. School-based Australian research reports that SLTs identified 12%–13% of primary and high school students as having a communication impairment (McLeod & McKinnon, 2007). They found communication disorder was more prevalent than both physical and intellectual disabilities. In the United Kingdom, a similar study identified 20% to 25% of the school-aged population as having communication needs (Bishop et al., 2017).

Language socialisation is responsive to broader cultural values and practices (Reese et al., 2015) and children acquire speech and language skills based on their relevance and value within particular contexts (Verdon et al., 2015). While patterns of communication need are associated with particular sociocultural and linguistic environments (Short et al., 2019), the discrepancy between these international and local prevalence rates indicates NZ reports of communication impairment are likely to be underestimates. While 95.4% of the population speak English, multilingual speakers in New Zealand have steadily increased from 15.8% in 2001, 18.6% in 2013 to 20.6% in 2018. More than 50% of people in Auckland are multilingual (Education Review Office, 2018). After English, Te Reo Māori (4%) and Samoan (2.2%) are the most common languages spoken.

### **A public health and human rights-based approach**

A public health model is compatible with a human-rights-based approach through the shared principles of equitable participation and non-discrimination (Wylie et al., 2014). New Zealand has a duty to provide inclusive education under the United Nations Convention on the Rights of Persons with Disabilities (United Nations, 2006). Children who are unsupported in their specific communication needs are at heightened risk of social and educational exclusion (Collisson et al., 2016) and people with com-

munication impairment experience poorer academic outcomes and less enjoyment of school (McCormack et al., 2011).

Public health approaches are cognisant of social determinants through the goals of primary, secondary and tertiary prevention (Wylie et al., 2014). Such prevention activities in New Zealand are best framed by the Child and Youth Wellbeing Strategy, which is committed to providing equitable participation for children with the most need, with a focus on learning support and mental wellbeing (Department of the Prime Minister & Cabinet, 2019). The consideration of communication disabilities from a public health perspective involves looking at population-level data to organise efforts to reduce incidence and impact of communication impairment (Wylie et al., 2014).

### **Parental knowledge and expectations of child speech and language development**

Both receptive and expressive communication development are supported by rich linguistic environments (Gibson et al., 2022) and communication partners who model the use of speech and language in everyday contexts (Adamson et al., 2020). Research on language socialisation suggests children's communicative environments are diverse, and the quality and quantity of linguistic input appear higher in families in higher socioeconomic status (SES) strata due to a complex array of factors. Rowe (2008) discovered a significant association between SES and child-directed speech in 47 American parent–child dyads. Parents from lower socioeconomic strata were more likely to address their children using directive speech compared with high-SES mothers who more often used elaborative speech to elicit conversation. Rowe identified that parental knowledge of child development mediated the relationship between SES and child-directed speech. This finding locates parental understandings of child development as a key determinant of children's early linguistic environments, where differing beliefs about child development are influential in the communication strategies parents choose to engage in with their children. Low SES when combined with other factors such as maternal depression compound the risks for poor language development (Law, Charlton, et al., 2017; McKean et al., 2017; Short et al., 2019). Whilst economic deprivation is a risk factor for poor language development, social and community support for the parents is a protective factor (Short et al., 2019), as is child participation in Early Education (Collisson et al., 2016). Children are typically exposed to numerous sources of language input additional to parent-child interactions, potentially underestimating the language environments of children from low SES backgrounds (Alper et al., 2021; Di Sante & Potvin, 2022). Responsivity to the child's

communicative attempts is also protective and supports language development (Smith et al., 2018).

The degree to which children are encouraged to participate in conversation is further related to broader cultural beliefs and practices (Adamson et al., 2020; Melzi et al., 2011; Rowe, 2008). In general, Western, English-speaking parents engage in highly elaborative strategies engaging with children as equal conversational partners, reflecting the broader cultural values of independence and individualism (Melzi et al., 2011; Prevo & Tamis-LeMonda, 2017). Directive speech, which requires less input from children, is more frequently observed in cultural contexts where interdependence and attentiveness to others' needs is valued (Prevo & Tamis-LeMonda, 2017). Elaborative engagement is associated with increased vocabulary size in children (Rowe, 2008), thus providing a useful example of how patterns of communication strengths and challenges are context-dependent (Verdon et al., 2015).

Recent research suggests NZ parents can correctly identify the main influences on children's language development (such as two-way verbal interaction), yet underestimate the importance of early linguistic input for language and academic success (Gibson et al., 2022). Survey responses from 500 parents found that, while parents emphasised their role in creating supportive linguistic environments, less than one third of parents recognised the significance of children's speech and language abilities when starting school (Gibson et al., 2022). This is important as the quality and quantity of linguistic input in children's early years has greater predictive power than both SES and parental education on later language and literacy skills (Adamson et al., 2020).

The Early Language in Victoria study investigated language development trajectories for a large cohort of 1910 children (McKean et al., 2017). They concluded that by 4 years old, greater stability was apparent in children's language levels and individual differences are established. They identified possible risk factors for children presenting with mild to moderate language difficulties at 4 years of age. This group tended to follow the trajectory of initially low levels of language that continued to decrease. The risk factors more prevalent in this group were socioemotional and behavioural problems, lower family literacy and low birth weight.

## Parental concern

For children with SLCNs, assessment by a qualified speech and language therapist who can develop an intervention plan in collaboration with the family has proven to be effective (Davies et al., 2017; Law, Dennis, et al., 2017). Health services increasingly recognise families as key agents in the success of interventions (Davies et al., 2017),

and interventions regularly focus on improving the child's immediate communication environment within the family (Law, Dennis, et al., 2017). It is widely accepted that parents are a valuable source of information about their children's speech and language, although they are less likely to report concerns about comprehension than expressive language, and less likely overall to report concern compared with teachers (McCormack et al., 2011). However, they are able to accurately identify how difficulties impact their child's current everyday well-being (McCormack et al., 2011).

Despite being able to identify speech and language delay in their children, Australian research suggests parents may assume that children will outgrow it. Amongst 109 children, 62.4% of families did not attempt to access speech-language therapies despite identifiable speech or language concerns (McAllister et al., 2011). The predominant barrier to accessing services was the belief that therapy was unnecessary. Further, parents who had concerns often expected teachers to identify communication challenges and were more likely to access services if their concerns were confirmed by others. Unfortunately, international and local reports from parents suggest both education and health professionals may respond inappropriately to parental concerns. Teachers may provide in-class communication supports but not suggest referral to speech-language services (Girolamo et al., 2022). Health practitioners may rely on the possibility of spontaneous recovery when parents express concern with language development. Rannard et al. (2005) found that in one quarter of children with severe language impairments, parental concerns were dismissed by health professionals.

In Aotearoa New Zealand, Māori report similar challenges accessing public services for their children with speech and language concerns (Faithfull et al., 2020). Within this qualitative study experiences were largely characterised by families' self-advocacy and persistence during the referral process to ensure their concerns were heard.

## The current study

This research is framed by a public health and human rights-based approach to communication disability acknowledging that children with SLCNs are best supported in their right to equitable participation when they are identified early. Through the provision of quality data on current levels of speech, language and communication skill in the first years of life, the current research can inform future prevention-focused activities. The current study supports the strategic priorities of government focusing on improving the wellbeing of all children, using data from Growing Up in New Zealand



(GUiNZ)—Aotearoa's largest population-based longitudinal study involving over 6000 children and their whānau (families) since before birth (Morton et al., 2018). The participants are representative of the NZ population in ethnic and socioeconomic composition (Morton et al., 2020) and can provide insight to the nature and extent of SLCNs across population groups. A key aim of the current study concerns the identification of specific communication capabilities. Secondly parental concern is examined through parent reports of SLC skill, and whether parents expressed concern when their children deviated from SLC milestones. The following research questions were thus identified: (1) What are the communication abilities of children in the first 5 years of life? (2) What do New Zealand parents understand of their children's communication? (3) Do New Zealand parents have concerns? (4) What are the trajectories of parental concern for children's communication in the first 6 years of life?

## METHOD

### Ethics

Researchers must meet all obligations from a list of criteria to gain approval from GUiNZ Data Access Committee. Data access approval granted, reference: 22DA001461.

### Participants

GUiNZ is a comprehensive longitudinal study of 6853 children and their whānau. The data set is representative of the broader New Zealand population in terms of ethnic and socioeconomic makeup with mothers and their partners recruited antenatally and contact anticipated up to the age of 21 years (see Morton et al., 2018, for the cohort profile). For the current study, data were available for  $N = 5241$ – $6321$  participants depending on the variable and data collection wave.

### Data collection waves

The overarching study design and conceptual framework are available at <https://www.growingup.co.nz/study-design>. At the time of analysis, cross-sectional data were available for the cohort at 24, 54 and 72 months of age. About three quarters of whānau (76%,  $n = 5241$ ) completed every cross-sectional data wave by age 8 (Morton et al., 2020). 'Speech' is the term used in the study questions to encompass all SLC, as opposed to just speech sound production. Data included measures of expressive

and receptive communication skills and whether speech had been raised as a concern. Tools included parent-report items, interviewer ratings and evidence-based speech and language assessments. No English-language communication skills data were collected directly from the children at 72 months old. There was variation in how data were collected between data waves (see Table 1).

## Expressive communication skills

### 24-month data wave

First spoken words and combining words are well-established milestones in children's communication development (Dosman et al., 2022). Hence, parent report on their child's oral language was captured. The total score from 100 vocabulary items on the MacArthur-Bates Communicative Developmental Inventory short form adapted for New Zealand English (NZE CDI:sf) was used as a measure of expressive communication (Reese et al., 2018). NZE CDI:sf is a valid and reliable tool to assess expressive vocabulary and early grammar development, for children from 16–30 months age. Interviewers provided a checklist of numbered English words and asked mothers whether their child spoke each word (see Appendix A).

### 54-month data wave

Expressive communication measures included parent and interviewer ratings. After classifying which languages their child spoke, mothers were asked five questions about their child's day-to-day use of language with multi-choice responses available (see Appendix B). After leaving the participant's house or interview location, the interviewer allocated the child an intelligibility rating (for connected speech) based on their observations of the child, responding to the question, *How often was [name] understandable when speaking to you?* [not applicable, never, rarely, sometimes, or often].

## Receptive communication skills

### 54-month data wave

Receptive communication was measured via the Peabody Picture Vocabulary Test (PPVT) (Rothman, 2010). The child is asked to select the picture they consider best captures the meaning of the word said by the administrator (Ly et al., 2020). The PPVT-III was chosen over more recent adaptations due to a wider body of empirical support.

TABLE 1 Speech, language and communication data collected at 24 and 54 months old.

Communication dimension	Method of data collection	Measures	
		24 month	54 month
Expressive communication	Parental report	<ul style="list-style-type: none"> <li>Approximately how old was child when he/she said his/her first word?</li> <li>Has your child begun to combine words yet, such as 'nother cookie' or 'doggie bite'?</li> </ul>	<ul style="list-style-type: none"> <li>Which of the following best describes [child's] pattern of asking questions?</li> <li>How often does {name} try out new words?</li> <li>Which of the following best describes {name}'s ability to communicate personal experiences in a clear logical way?</li> <li>How often is {name} understandable when speaking to adults other than you or other family members?</li> <li>Which of the following best describes {name}'s ability to communicate when {he/she} is not first understood?</li> <li>How often was [name] understandable when speaking to you?</li> </ul>
	Interviewer rating	None	
	Standardised assessment	MacArthur-Bates Communicative Developmental Inventory short form—New Zealand English (NZE CDI:sf) (Reese et al., 2018)	None
Receptive vocabulary	Standardised assessment	None	Peabody Picture Vocabulary Test (PPVT-III) (Rothman, 2010)

This tool was developed for American English, however autoethnography research indicates PPVT-III is suitable for New Zealand children, including Māori (Haitana et al., 2010). The PPVT-III was adapted, with 40 items in total administered. If the child was able to answer two training plates correctly, up to three sets in total were administered (see Appendix C), with the child progressing to the subsequent set only if they did not exceed a predefined number of errors. The test was terminated immediately if a child stopped participating.

Raw scores were added, then adjusted according to the differential difficulty between items. A latent receptive language variable was created with a score from  $-4$  to  $+3$  (see GUiNZ technical manual for details). Questions of average difficulty were given a score of 1, whereas correct items with lower or higher difficulties were adjusted to non-negative score values of  $<1$  and  $>1$ , respectively (Ly et al., 2020). Ranked scores were transformed into binned deciles using SPSS 28.0 statistical software.

### Trajectories of parental concern

Parental concern was reported at three time points. At 24- and 54-month data waves, mothers indicated whether they had any concerns regarding their child's speech broadly construed. At 72 months, mothers were asked if speech was raised as a concern during their child's Before School Check (B4SC), a government-funded screening tool

administered with parents of children at 4–5 years of age to identify potential behavioural, developmental or health concerns (Ministry of Health, 2008). The B4SC includes the Parental Evaluation of Developmental Status with 10 questions about behaviour, speech, language and motor skills for example, 'Do you have any concerns about how your child talks and makes speech sounds?' Responses to this item were used in the absence of other GUiNZ data regarding concern at this age (Table 2).

Responses at each of the three time points were classified into one of eight speech concern trajectories to identify changes in concern over time. For example, parents who were concerned at all three time points were classified as YYY, those who were concerned at 24 months ( $T_1$ ) and 54 months ( $T_2$ ) but not 72 months ( $T_3$ ) were classified as YYN: ( $T_1T_2T_3 = YYY, YNN, NNN$ , etc.)

### Analysis

Data were analysed using SPSS software to generate descriptive statistics. Pearson's chi-square tests were also run to examine associations between expressive and receptive communication and parental concerns with significance set at  $p < 0.05$ . When chi-square assumptions were not met due to small cell counts, Fisher's exact tests were conducted with significance set at  $p < 0.05$ . Missing data includes those who were not present, did not respond or refused to respond.

**TABLE 2** Measures of parental concern regarding speech at each data wave.

Child age	Question	Possible response
24 months	Do you feel any concerns about your child's speech or hearing, such as:	Does not understand others when they speak Does not understand you when you speak Difficulty finding words Difficulty putting words together Reluctant to speak Speech not clear to family Speech not clear to others Stutters, stammers or lisps Voice sounds unusual
54 months	Have any of the following been raised as possible areas of concern for {name}	Speech
72 months	To your knowledge, were any of the following raised as a possible area of concern for your child as a result of their Before School Check	Speech

Note: The identification of a concern was coded as a 'yes' response and no indication of a concern was coded as a 'no' response.

**TABLE 3** Expressive vocabulary score on the NZE CDI:Sf based on all English-speaking respondents ( $n = 6076$ ) and word combination scores based on all respondents ( $n = 6293$ ), at 24 months.

	Expressive vocabulary <i>M</i> ( <i>SD</i> )	Not yet combining ( <i>n</i> , %)	Sometimes combining ( <i>n</i> , %)	Often combining ( <i>n</i> , %)
<i>Child sex</i>				
Male	46.4 (26.6)	526 (16.1)	937 (28.7%)	1785 (54.7%)
Female	47.3 (26.6)	297 (9.7%)	675 (22.1%)	2073 (67.8%)
Total	46.9 (26.6)	823 (13.0%)	1612 (25.5%)	3858 (61.0%)

Note: Results exclude missing data and children who were not yet speaking. Mean vocabulary and SD scores further excluded all participants who could not be administered the NZE CDI:sf.

Abbreviation: NZE CDI:sf, New Zealand English Communicative Development Inventory short form.

## RESULTS

### Communication abilities at 24 months old

The mean age of first words spoken was 10 months ( $SD = 2$ ) by parent report, whilst 211 (3.2%) children were not yet speaking at the time of 24-month interview. Total expressive vocabulary scores from NZE CDI:sf were assessed (maximum score achievable = 100). Parents were asked if their child had begun to combine words, with responses: don't know, not yet, sometimes, often. Both measures are reported as a function of sex (Table 3). Mean total word scores (46–47) were similar for boys and girls and showed wide variation across participants ( $SD = 27$ ).

### Communication abilities at 54 months old

Based on frequency of parent responses, relative expressive communication strengths and challenges were identified in the cohort (Figure 1). For example, three quarters of

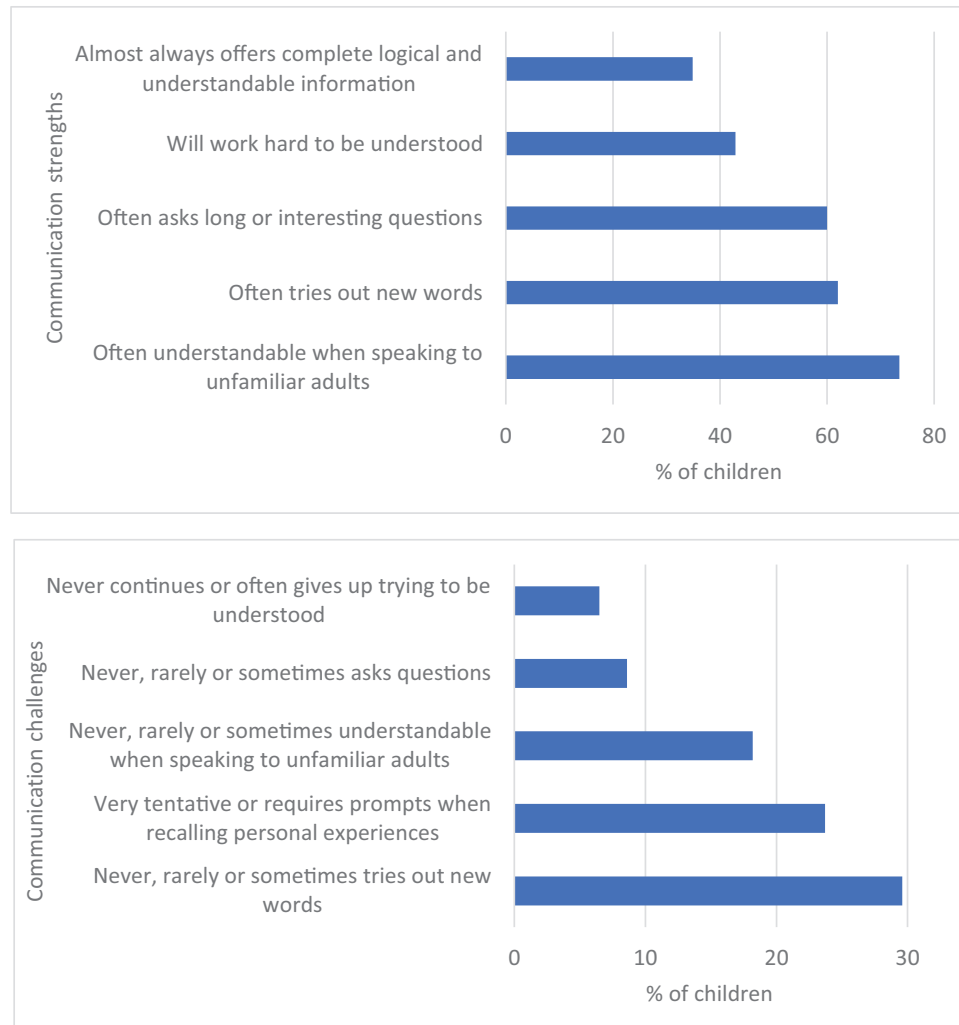
**TABLE 4** Parent responses at 54 months ( $n = 6122$ ): 'Which of the following describes {name}'s pattern of asking questions?'

	<i>N</i>	%
Never or rarely asks adults questions	76	1.2
Occasionally asks adults questions	500	8.1
Sometimes asks adults interesting questions	1536	25.1
Often asks adults interesting or long questions	4010	65.5

the children were reported as often understandable when speaking with unfamiliar adults, but almost a quarter of children were reported by their parent to be very tentative or requiring prompting when describing personal experiences. Detailed results from analysis of individual measures are described in Tables 4–7.

### Receptive versus expressive communication

Receptive language was measured only at the 54-month data wave and only regarding vocabulary (median age = 54.12 months, range = 48.03–68.35 months). The mean



**FIGURE 1** Expressive communication strengths (upper graph) and challenges (lower graph) of the cohort at 54 months. [Colour figure can be viewed at [wileyonlinelibrary.com](http://wileyonlinelibrary.com)]

**TABLE 5** Parent responses at 54 months.

	Often		Sometimes		Never or rarely	
	N	%	N	%	N	%
How often does {name} try out new words? (n = 6113)	4139	67.7	1849	30.2	125	2.0
How often is {name} understandable when speaking to adults other than you or other family members? (n = 6122)	4908	80.2	1126	18.4	88	1.4

**TABLE 6** Parent responses at 54 months (n = 6109): '{Name}'s Ability to Communicate Personal Experiences in a Clear Logical Way'.

	N	%
{He/she} is very tentative, only offers a few words and requires you to ask questions	210	3.4
{He/she} offers some information, but needs you to prompt for key parts of the story	1375	22.5
{He/she} offers information and includes the necessary information to really understand the event	2193	35.8
{He/she} offers information and tells experiences in a way that is nearly always complete, logical and understandable	2331	38.1



**TABLE 7** Parent responses at 54 months ( $n = 6114$ ): '{Name}'s ability to communicate when {He/She} is not first understood'

	N	%
{He/she} never continues trying to be understood.	89	1.4
{He/she} often gives up trying to be understood.	345	5.6
{He/she} often keeps trying to be understood.	2817	46.1
{He/she} will work hard to be understood	2863	46.8

derived PPVT-III (latent receptive language) score for the 5601 children able to engage in the task was 0.0 (SD = 0.901). A Pearson's chi-square test comparing the association between the derived PPVT-III variable and interviewer ratings of intelligibility ( $n = 5587$ ) was significant,  $\chi^2(27) = 487.396, p < 0.001$ . Children reported as never or rarely understandable to an interviewer ( $n = 67$ ) and those sometimes understandable ( $n = 197$ ) were more frequently categorised in the lowest PPVT-III decile than any other decile, accounting for 47% of the cases in the lowest decile.

### Parent understanding of their child's communication

At 54 months parents were asked, how often is {name} understandable when speaking to adults other than you or other family members? (Table 8). Similarly, the interviewer had to report, how often was {name} understandable when speaking to you? [never, rarely, sometimes, or often]. Parent and interviewer ratings of child connected speech intelligibility with unfamiliar people were largely in agreement, with parents tending towards rating them as more intelligible.

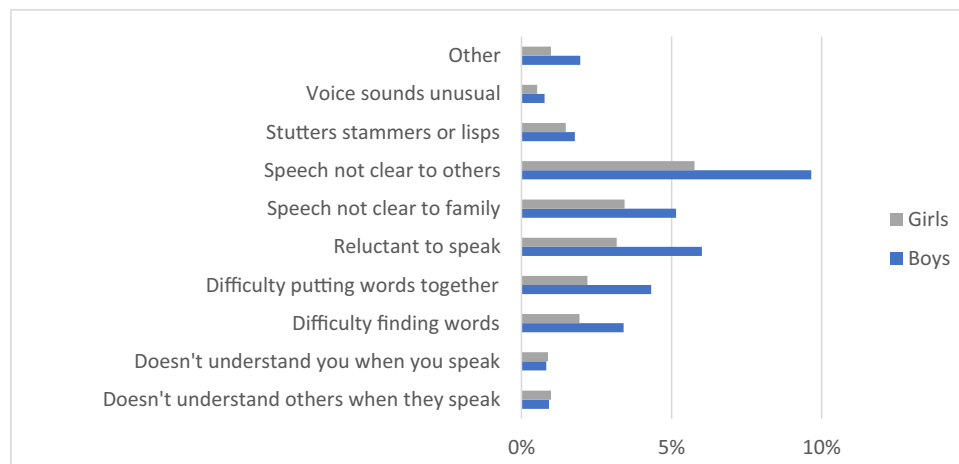
**TABLE 8** Interviewer ( $n = 5733$ ) and parent ratings of child connected speech intelligibility at 54 months old ( $n = 6122$ ).

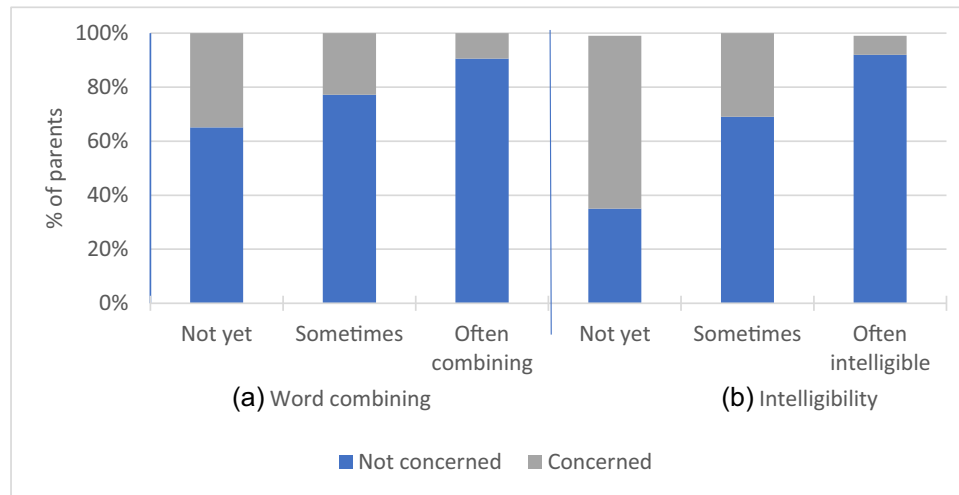
	Interviewer rating		Parental rating	
	N	%	N	%
Never or rarely intelligible	237	4.1	88	1.4
Sometimes intelligible	1028	17.9	1126	18.3
Often intelligible	4468	77.9	4908	80.1

### Parental concern about speech, language and communication

At 24 months, 16% of children in the cohort had communication skills that were of concern to their parents, and parents were somewhat or very concerned about 31% of those children. Speech being not clear was the most frequently reported concern (Figure 2).

Although 823 (13%) children were reported as not yet combining words at 24 months old, only 287 (35%) of those parents were concerned about speech and 208 (25%) children had a parent express specific concern that their child 'had difficulty putting words together' (Figure 3a). A Pearson's chi-square comparing the association between parental concern about any component of speech and combining words at 24 months old was significant,  $\chi^2(2) = 395.85, p < 0.001$ . The expected pattern would be greater parental concern amongst those with children not yet combining words—however, this pattern was not observed. Parents who were concerned about their child's speech were more likely to report that their child sometimes ( $n = 367, 36.1%$ ) or often ( $n = 362, 35.6%$ ) combined words, with fewer parents who identified a speech concern reporting that their child had not yet begun to combine words ( $n = 287, 28.2%$ ).

**FIGURE 2** Aspects of parental concern about speech for their child at 24 months old, by sex ( $n = 1026$ ). [Colour figure can be viewed at wileyonlinelibrary.com]



**FIGURE 3** Children's reported skills as a function of parental concern for their speech. a) parents' report of their child putting words together b) parents' report of their child's intelligibility to unfamiliar adults [Colour figure can be viewed at [wileyonlinelibrary.com](http://wileyonlinelibrary.com)]

**TABLE 9** Parental concern about speech (*N*, %) as a function of PPVT-III (receptive vocabulary) deciles 1 to 10 (*n* = 5598).

	D1	D2	D3	D4	D5	D6	D7	D8	D9	D10	Total
Concerned	97 (17.3)	84 (15.1)	79 (14.1)	72 (12.9)	75 (13.4)	58 (10.4)	71 (12.7)	49 (8.8)	46 (8.2)	51 (9.1)	682
Not concerned	464 (82.7)	474 (84.9)	482 (85.9)	488 (87.1)	484 (86.6)	502 (89.6)	489 (87.3)	511 (91.3)	514 (91.8)	508 (90.9)	4916
Total	561	558	561	560	559	560	560	560	560	559	5598

At 54 months, 12.6% of children in the cohort had speech that was of concern to parents. A Fisher's exact test determined a significant relationship ( $p < 0.001$ ) between parental concern about speech and parent ratings of their child's intelligibility to unfamiliar adults. The analysis tested the hypothesis that parents who rated their child as never or rarely or sometimes understandable to unfamiliar adults would be more likely to be concerned over their child's expressive language abilities. In fact, the analysis found a significant proportion of parents who did not indicate a speech concern had rated their child as never or rarely ( $n = 31$ , 0.6%), or only sometimes understandable ( $n = 775$ , 14.5%) to unfamiliar adults (Figure 3b).

Pearson's chi-square comparing the association between parental concern and receptive vocabulary was significant,  $\chi^2(9) = 42.079$ ,  $p < 0.001$ , and showed the anticipated link between concern and child ability. Decile 1 comprises children with the lowest scores on the PPVT-III test, and decile 10 includes children who scored the highest in the cohort. Parents of children at 54 months old with the highest scores on the PPVT-III test (deciles 8, 9, 10) were less likely to report speech concern than parents of children in the lower categories (deciles 1, 2, 3) (Table 9).

Abbreviation: PPVT-III, Peabody Picture Vocabulary Test-III.

Cross-sectional descriptive analysis provided frequencies across all eight potential concern trajectories based

**TABLE 10** Trajectories of parental concern about speech across three time points ( $n = 5124$ ).

Concern at 24-, 54- and 72-months age	<i>N</i>	%
YYY	83	1.6
YYN	158	3.0
YNY	22	.4
YNN	543	10.6
NYY	117	2.3
NYN	298	5.8
NNY	57	1.1
NNN	3846	75.0

Note: The identification of a concern was coded 'Y' and no indication of a concern was coded 'N'.  $T_1T_2T_3 = YYY, YNN, NNN$ , etc.

on the three data points (24 and 54 months, 72 months) (Table 10). At the B4SC, 5.6% of children had speech that raised as a concern. Overall, a majority of parents (75%) did not identify any concerns about speech at any time point. A very small percentage reported concern about speech at two (5.7%) or all three (1.6%) of the three time points.

## DISCUSSION

Recognising the specific communication capabilities of young children at a population level is integral to



organising universal, targeted and specialist services that support equitable participation for all children and whānau (Wylie et al., 2014). The current study provides insight into SLC abilities of children in Aotearoa New Zealand and parental knowledge and concerns about their children's communication.

## Child speech, language and communication abilities

At 2 years of age, the average expressive vocabulary score for English-speaking children in the cohort was within the normal range for the NZE CDI:sf at 24 months of age (Fenson et al., 2000; Reese et al., 2018). According to well-established milestones for English speakers, at age 2 children should have an average vocabulary of 50 words (Dosman et al., 2022) although the range of normal is not specified with this milestone. Reese et al. (2018) reported a significant difference in vocabulary scores between monolingual and bilingual English speakers in New Zealand, whereby bilingual children had 10 fewer English words on average. Similarly, boys were found to have 10 fewer words than girls of the same age. In our cohort there was no difference between the scores of boys and girls. The cohort scored on average at the 50th centile and with 47% of the 24-month cohort identified as bi- or multilingual, the English vocabulary score is unlikely to represent the full vocabulary of many children in this cohort.

Nearly two thirds of mothers reported that their child was often combining words at 2 years. Common developmental milestones suggest English-speaking children at 2 years are expected to use two-word phrases, such as, 'more cookie' (Dosman et al., 2022); however, the frequency with which 2-year-olds should use these word combinations is not well reported in the literature. Research comparing precocious and typical talkers at 2 years in the United States found that all children combined words 'at least some of the time' (McGregor et al., 2005, p. 573). In their study, a quarter of the sample were classified as 'ethnic minorities' by their parents, and all were monolingual speakers of English (McGregor et al., 2005). There is evidence that bilingual children typically take longer to learn each language than monolingual children (Reese et al., 2018), hence children in the current study who were identified as not yet combining words would ideally have been assessed across all their languages.

Although the familiarity of parents influences their perceptions of their children's speech (Hustad et al., 2021), there is sound evidence that parents can accurately report their children's speech and language abilities. This is supported by local survey research (Gibson et al., 2022). The current study partially replicated this, as parent and

interviewer ratings of child intelligibility were largely in agreement. It is well-established that between 48–60 months, children should be 100% intelligible to strangers in connected speech (Coplan & Gleason, 1988; Dosman et al., 2022). For a majority of the cohort this was a strength. However, nearly one fifth of children were identified by their mothers or an interviewer as never, rarely or only sometimes understandable to an unfamiliar adult. Although some children may have achieved 100% intelligibility in the following 6 months, compared to Australian data (McLeod & McKinnon, 2007), these results are concerning. Recent research has questioned this established milestone for intelligibility and suggests a more accurate milestone of 62–87 months for connected speech to be 100% intelligible to strangers (Hustad et al., 2021). Their study suggests that between 46–61 months children are only 75% intelligible. If 'never, rarely or sometimes' are interpreted as <75% intelligible, then our GUiNZ results are still a concern.

A strengths-based outlook is increasingly promoted, as it can empower children by supporting learning through the creation of the least restrictive environment (Donaldson et al., 2017). Over two thirds of mothers indicated that their child was often understandable when speaking to adults other than themselves or family members. Similarly, nearly two thirds of mothers classified their child as often trying out new words and asking long or interesting questions. However, providing the best support for children's communication requires the identification of specific challenges, which will help determine the prevalence and nature of speech language communication needs more broadly. We found that nearly one third of mothers classified their child as never, rarely or sometimes trying out new words. At age 4½, less than half of the cohort were identified as often able to eventually communicate when not initially understood, and as often communicating personal experiences in a clear and logical way. Almost one quarter of children were very tentative when describing personal experiences and never or rarely communicated in a clear and logical way. Around a tenth of mothers reported that their children never, rarely or occasionally asked long and interesting questions, and never continued, or often gave up trying to communicate when they are not initially understood. These findings highlight the need for population-, or whānau-targeted strategies for supporting SLC development.

Language comprehension is foundational to later production of words (Adamson et al., 2020). Not surprisingly, we found a significant association between expressive and receptive abilities—children with low intelligibility were disproportionately represented in the lowest receptive vocabulary deciles. This may reflect broad language learning difficulties or a cascade effect of less language

exposure and fewer opportunities for expressive language development because of a low level of intelligibility.

## Parental concern

Parental concern depends on an understanding of children's age-appropriate SLC milestones. Our findings match previous research indicating parents can accurately report their children's speech and language abilities (Rannard et al., 2005). Parents less frequently rated their child as never or rarely understandable to adults other than themselves or family members, possibly because parents are experienced listeners of their child's speech, and parents witness their children communicate with other adults on numerous occasions, not just at a single event. Despite this, parental and interviewer ratings were largely in agreement.

In the 24-month data wave, there was a higher proportion of concerned parents for children who were sometimes or often combining words, than for children who were not yet combining words. It may be that children who were not yet combining words were speaking less frequently overall, providing parents with fewer opportunities to detect speech abnormalities, or perhaps their single words were clear. Parents were more concerned if they experienced more of their child's speech.

The 54-month data analysis further suggested that parents may not show concern when their child's communication is delayed. Contrary to our hypothesis, when comparing parent concerns about speech with their own estimations of intelligibility, parents who reported their child was only sometimes intelligible were largely unconcerned. Parents may underestimate communication delay as a cause for concern due to poor awareness of connections between typical speech and language milestones and future academic achievement and occupational attainment (McCormack et al., 2011; Rannard et al., 2005).

The significant association between parental speech concerns and children's receptive communication abilities suggests parents are not insensitive to their child's communication needs. Indeed, more parents indicated concern in lower PPVT-III deciles, and fewer parents indicated concern when receptive vocabulary scores were in higher deciles. However, 464 of the unconcerned parents' children scored in the lowest PPVT-III decile. Their latent receptive language scores were significantly lower than 1 SD below the mean, yet absence of parental concern suggests they were unaware of their child's higher communication needs, or they underestimate the significance of low receptive vocabulary (McAllister et al., 2011; Rannard et al., 2005).

We identified eight potential communication concern trajectories with most parents categorised as no concerns at any data point. The next most common trajectory was where concern was identified in the 24-month data wave and subsequently not expressed. Historic clinical advice suggested that a proportion of speech and language problems self-resolve by age 3 years (Bamford et al., 1998; Whitehurst & Fischel, 1994); however, this is now contested, especially with communication difficulties that do not become apparent until after 2 years of age. McKean et al. (2017) concluded that by 4 years old, greater stability was apparent in children's language levels and individual differences are established. The 'NYY' and 'NNY' concern trajectories (3.4%) are indicative of concern arising later in the child's life. In both 'NYN' and 'YYN', parents identified a specific speech concern in the 54-month data wave yet speech was not raised as an area of concern at the B4SC. Direct speech and language assessment from the B4SC is limited (Ministry of Health, 2008). It is contentious whether the concerns at 54 months had resolved at the time of screening or were not captured by the B4SC.

## Strengths, limitations and future directions

GUINZ data has a significant number of non-participant mothers with missing data, who were more likely to live in areas of high deprivation when their child was in preschool, not have obtained any formal educational qualifications, and identify as Māori, Pacific, or Asian rather than Pākehā/NZ European (Morton et al., 2018). Ethnicity and deprivation status have predictive effects for language acquisition of NZ children due to a complex array of factors (Reese et al., 2018).

We analysed the MacArthur Bates CDI:sf only in English. At 24 months, GUINZ also administered the test in Māori, Samoan, Tongan, Cantonese and Mandarin. Reese et al. (2015) highlighted methodological limitations including the assumption that mothers are the primary caregivers of young children and can best represent their language abilities. Reese et al. acknowledged the disadvantages of direct translation from English for the CDI, which resulted from pragmatism rather than best practice. Future research should focus on development of communication inventories based on culturally relevant, naturally occurring language for an equitable representation of language acquisition amongst non-English-speaking or multilingual speakers.

The choice to explore SLC at a population-level using gross quantitative measures comes at the expense of capturing the complexity and meaning behind family experiences. Further capturing the voices of families would



inform effective resource allocation, acknowledging the considerable knowledge they possess about their children (Davies et al., 2017).

Given the broad ambition of the GUINZ study to capture the general status of health and development (Morton et al., 2020), opportunities to capture detailed communication abilities were compromised. All measures relied on parent report of speech which may or may not have captured language or broader communication concerns, depending on individual interpretation.

## CONCLUSION

Many preschool children who were rated as intelligible when speaking to adults other than their family members, however, were not always able to communicate their personal experiences in a clear, logical way. Parents were knowledgeable of their children's expressive communication abilities, consistent with previous research, but many parents were unconcerned when their child was delayed in their communication development. Given the crucial role of families in identification and support of children with high communication needs, future public health strategies should focus on empowerment of families through education. Increased awareness through public health messaging specifically regarding consequences of communication challenges will aid in prevention, early detection and intervention to support children to thrive through effective communication.

## ACKNOWLEDGEMENTS

No specific funding was obtained for this research.

Open access publishing facilitated by The University of Auckland, as part of the Wiley - The University of Auckland agreement via the Council of Australian University Librarians.

## CONFLICT OF INTEREST STATEMENT

Authors report no known conflict of interest.

## DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available from Growing Up in New Zealand. Restrictions apply to the availability of these data, which were used under license for this study. Data are available from <https://www.growingup.co.nz/> with the permission of Growing Up in New Zealand.

## ORCID

Bianca N. Jackson  <https://orcid.org/0000-0001-5566-8276>

## REFERENCES

- Adamson, L.B., Kaiser, A.P., Tamis-LaMonda, C.S., Owen, M.T. & Dimitrova, N. (2020) The developmental landscape of early parent-focused language intervention. *Early Childhood Research Quarterly*, 50, 59–67. <https://doi.org/10.1016/j.ecresq.2018.11.005>
- Alper, R.M., Beiting, M., Luo, R., Jaen, J., Peel, M., Levi, O., Robinson, C. & Hirsh-Pasek, K. (2021) Change the things you can: modifiable parent characteristics predict high-quality early language interaction within socioeconomic status. *Journal of Speech Language Hearing Research*, 64(6), 1992–2004. [https://doi.org/10.1044/2021\\_JSLHR-20-00412](https://doi.org/10.1044/2021_JSLHR-20-00412)
- Bamford, J., Davis, A., Boyle, J., Law, J., Chapman, S., Brown, S.S. & Sheldon, T.A. (1998) Preschool hearing, speech, language and vision screening. *Quality in Health Care*, 7(4), 240–247. <https://doi.org/10.1136/qshc.7.4.240>
- Bishop, D.V.M., Snowling, M.J., Thompson, P.A., Greenhalgh, T., & Catalise Consortium. (2017) Phase 2 of CATALISE: a multinational and multidisciplinary Delphi consensus study of problems with language development: terminology. *Journal of Child Psychology and Psychiatry*, 58(10), 1068–1080. <https://doi.org/10.1111/jcpp.12721>
- Collisson, B.A., Graham, S.A., Preston, J.L., Rose, M.S., McDonald, S. & Tough, S. (2016) Risk and protective factors for late talking: an epidemiologic investigation. *Journal of Pediatrics*, 172, 168–174 e161. <https://doi.org/10.1016/j.jpeds.2016.02.020>
- Coplan, J. & Gleason, J.R. (1988) Unclear speech: recognition and significance of unintelligible speech in preschool children. *Pediatrics*, 82(3), 447–452. <https://doi.org/10.1542/peds.82.3.447>
- Davies, K.E., Marshall, J., Brown, L.J.E. & Goldbart, J. (2017) Co-working: parents' conception of roles in supporting their children's speech and language development. *Child Language Teaching and Therapy*, 33(2), 171–185. <https://doi.org/10.1177/0265659016671169>
- Department of the Prime Minister and Cabinet. (2019) *The New Zealand child and youth wellbeing strategy*.
- Di Sante, M. & Potvin, L. (2022) We need to talk about social inequalities in language development. *American Journal of Speech Language Pathology*, 31(4), 1894–1897. [https://doi.org/10.1044/2022\\_AJSLP-21-00326](https://doi.org/10.1044/2022_AJSLP-21-00326)
- Donaldson, A.L., Chabon, S., Lee-Wilkerson, D. & Kapantzoglou, M. (2017) Mirror, mirror on the wall: reflections on speech-language pathologists' image as advocates, activists, and aides. *Psychology in the Schools*, 54(10), 1285–1293. <https://doi.org/10.1002/pits.22083>
- Dosman, C., Gallagher, S., La Berge, P., Sahagian Whalen, S., Plaisance, M., Koscielniuk, D., Dufour, L.-A. & Andrews, D. (2022) Updated evidence-based developmental attainments for children: first 6 years. *Paediatrics and Child Health*, 27, 285–290. <https://doi.org/10.1093/pch/pxac038>
- Ebbels, S.H., McCartney, E., Slonims, V., Dockrell, J.E. & Norbury, C.F. (2019) Evidence-based pathways to intervention for children with language disorders. *International Journal of Language & Communication Disorders*, 54(1), 3–19. <https://doi.org/10.1111/1460-6984.12387>
- Faithfull, E., Brewer, K.M. & Hand, L. (2020) The experiences of whānau and kaiako with speech-language therapy in kaupapa Māori education. *MAI Journal: A New Zealand Journal of Indigenous Scholarship*, 9(3). <https://doi.org/10.20507/MAIJournal.2020.9.3.3>



- Fenson, L., Pethick, S., Renda, C., Cox, J.L., Dale, P.S. & Reznick, J.S. (2000) Short-form versions of the MacArthur communicative development inventories. *Applied Psycholinguistics*, 21(1), 95–116. <https://doi.org/10.1017/S0142716400001053>
- Gibson, E., Sutherland, D. & Newbury, J. (2022) New Zealand parents/caregivers' knowledge and beliefs about child language development. *Speech, Language and Hearing*, 25(2), 153–165. <https://doi.org/10.1080/2050571X.2020.1827829>
- Girolamo, T.M., Rice, M.L., Selin, C.M. & Wang, C.J. (2022) Teacher educational decision making for children with specific language impairment. *American Journal of Speech Language Pathology*, 31(3), 1221–1243. [https://doi.org/10.1044/2021\\_AJSLP-20-00366](https://doi.org/10.1044/2021_AJSLP-20-00366)
- Haitana, T., Pitama, S., & Rucklidge, J. J. (2010). Cultural biases in the Peabody Picture Vocabulary Test-III: Testing tamariki in a New Zealand sample. *New Zealand Journal of Psychology*, 39(3), <https://www.psychology.org.nz/journal-archive/Haitana.pdf>
- Hustad, K.C., Mahr, T.J., Natzke, P. & Rathouz, P.J. (2021) Speech development between 30 and 119 months in typical children i: intelligibility growth curves for single-word and multiword productions. *Journal of Speech Language and Hearing Research*, 64(10), 3707–3719. [https://doi.org/10.1044/2021\\_JSLHR-21-00142](https://doi.org/10.1044/2021_JSLHR-21-00142)
- Law, J., Charlton, J., Dockrell, J., Gascoigne, M., McKean, C. & Theakston, A. (2017) *Early language development: needs, provision, and intervention for preschool children from socio-economically disadvantage backgrounds*. London: Institute of Education.
- Law, J., Dennis, J.A. & Charlton, J.J.V. (2017) Speech and language therapy interventions for children with primary speech and/or language disorders [Protocol]. *Cochrane Database of Systematic Reviews*, 2017(1), CD012490. <https://doi.org/10.1002/14651858.Cd012490>
- Law, J., Roulstone, S. & Lindsay, G. (2015) Integrating external evidence of intervention effectiveness with both practice and the parent perspective: development of 'what works' for speech, language, and communication needs. *Developmental Medicine & Child Neurology*, 57(3), 223–228.
- Ly, K., Lai, H., Smith, A., Walker, C., Morton, S.M.B. & Neumann, D. (2020) *Growing up in New Zealand technical report: children's performance on the adapted Peabody Picture Vocabulary Test*, Third edition, Growing Up in New Zealand.
- McAllister, L., McCormack, J., McLeod, S. & Harrison, L.J. (2011) Expectations and experiences of accessing and participating in services for childhood speech impairment. *International Journal of Speech Language Pathology*, 13(3), 251–267. <https://doi.org/10.3109/17549507.2011.535565>
- McCormack, J., Harrison, L.J., McLeod, S. & McAllister, L. (2011) A nationally representative study of the association between communication impairment at 4–5 years and children's life activities at 7–9 years. *Journal of Speech, Language, and Hearing Research*, 54(5), 1328–1348. [https://doi.org/10.1044/1092-4388\(2011/10-0155\)](https://doi.org/10.1044/1092-4388(2011/10-0155))
- McGregor, K.K. (2020) How we fail children with developmental language disorder. *Language, Speech & Hearing Services in Schools*, 51(4), 981–992. [https://doi.org/10.1044/2020\\_LSHSS-20-00003](https://doi.org/10.1044/2020_LSHSS-20-00003)
- McGregor, K.K., Sheng, L. & Smith, B. (2005) The precocious two-year-old: status of the lexicon and links to the grammar. *Journal of Child Language*, 32(3), 563–585. <https://doi.org/10.1017/S0305000905006926>
- McKean, C., Reilly, S., Bavin, E.L., Bretherton, L., Cini, E., Conway, L., Cook, F., Eadie, P., Prior, M., Wake, M. & Mensah, F. (2017) Language outcomes at 7 years: early predictors and co-occurring difficulties. *Pediatrics*, 139(3), e20161684. <https://doi.org/10.1542/peds.2016-1684>
- McLeod, S. & McKinnon, D.H. (2007) Prevalence of communication disorders compared with other learning needs in 14,500 primary and secondary school students. *International Journal of Language and Communication Disorders*, 42(Supplement 1), 37–59. <https://doi.org/10.1080/13682820601173262>
- Melzi, G., Schick, A.R. & Kennedy, J.L. (2011) Narrative elaboration and participation: two dimensions of maternal elicitation style. *Child Development*, 82(4), 1282–1296. <https://doi.org/10.1111/j.1467-8624.2011.01600.x>
- Ministry of Health (2008) *The B4 school check: a handbook for practitioners*. Wellington: New Zealand Ministry of Health.
- Morton, S.M.B., Grant, C.C., Walker, C.G., Berry, S.D., Meissel, K., Ly, K., Marks, E.J., Underwood, L., Fa'alili-Fidow, J., Wilson, S., Pillai, A. & Kim, H. (2018) Transition to school. Growing Up in New Zealand. Available from: [www.growingup.co.nz/growing-up-reports](http://www.growingup.co.nz/growing-up-reports)
- Morton, S.M.B., Walker, C.G., Gerritsen, S., Smith, A., Cha, J., Atotoa Carr, P., Chen, R., Exeter, D.J., Fa'alili-Fidow, J., Fenaughty, J., Grant, C., Kim, H., Kingi, T., Lai, H., Langridge, F., Marks, E.J., Meissel, K., Napier, C., Paine, S., Peterson, E.R., ... & Wall, C. (2020) Now we are eight. Ministry of Social Development. Available from: [www.growingup.co.nz/growing-up-reports](http://www.growingup.co.nz/growing-up-reports)
- New Zealand Education Review Office (2018) *Responding to language diversity in Auckland*. Wellington: New Zealand Government. Available from: <https://ero.govt.nz/sites/default/files/2021-05/ALD-report2.pdf>
- Prevo, M. & Tamis-LeMonda, C.S. (2017) Parenting and globalization in western countries: explaining differences in parent-child interactions. *Current Opinion in Psychology*, 15, 33–39. <https://doi.org/10.1016/j.copsyc.2017.02.003>
- Rannard, A., Lyons, C. & Glenn, S. (2005) Parent concerns and professional responses—the case of specific language impairment. *British Journal of General Practice*, 55, 710–714.
- Reese, E., Ballard, E., Taumoepeau, M., Taumoeofolau, M., Morton, S.M.B., Grant, C.C. & Perese, L. (2015) Estimating language skills in Samoan- and Tongan-speaking children growing up in New Zealand. *First Language*, 18(4–5), 407–427. <https://doi.org/10.1177/0142723715596099>
- Reese, E., Keegan, P., Mcnaughton, S., Kingi, T.K., Carr, P.A., Schmidt, J., Mohal, J., Grant, C. & Morton, S. (2018) Te reo Māori: indigenous language acquisition in the context of New Zealand English. *Journal of child language*, 45(2), 340–367. <https://doi.org/10.1017/S030500091700024>
- Rothman, S. (2010) Report on adapted PPVT-iii and Who am I? Australian Institutes of Family Studies. Available from: [hdl.handle.net/10620/17497](http://hdl.handle.net/10620/17497) [Accessed 2nd June 2023].
- Rowe, M.L. (2008) Child-directed speech: relation to socioeconomic status, knowledge of child development and child vocabulary skill. *Journal of Child Language*, 35(1), 185–205. <https://doi.org/10.1017/S0305000907008343>
- Short, K., Eadie, P. & Kemp, L. (2019) Paths to language development in at risk children: a qualitative comparative analysis (QCA). *BMC Pediatrics*, 19(1), 94. <https://doi.org/10.1186/s12887-019-1449-z>
- Skeat, J., Wake, M., Ukoumunne, O.C., Eadie, P., Bretherton, L. & Reilly, S. (2014) Who gets help for pre-school communication problems? Data from a prospective community study. *Child: Care*,



- Health and Development*, 40(2), 215–222. <https://doi.org/10.1111/cch.12032>
- Smith, J., Levickis, P., Eadie, T., Bretherton, L., Conway, L. & Goldfeld, S. (2018) Concurrent associations between maternal behaviours and infant communication within a cohort of women and their infants experiencing adversity. *International Journal of Speech-language Pathology*, 20(5), 516–527. <https://doi.org/10.1080/17549507.2017.1329458>
- Statistics New Zealand. (2014) *Disability Survey: 2013*. Available from: <https://www.stats.govt.nz/information-releases/disability-survey-2013> [Accessed 2nd June 2023].
- United Nations. (2006) Convention on the rights of persons with disabilities (CRPD). Available from: <https://www.un.org/development/desa/disabilities/convention-on-the-rights-of-persons-with-disabilities.html>
- Verdon, S., McLeod, S. & Wong, S. (2015) Supporting culturally and linguistically diverse children with speech, language and communication needs: overarching principles, individual approaches. *Journal of Communication Disorders*, 58, 74–90. <https://doi.org/10.1016/j.jcomdis.2015.10.002>
- Whitehurst, G.J. & Fischel, J.E. (1994) Practitioner review: early developmental language delay: what, if anything, should the clinician do about it? *Journal of Child Psychology and Psychiatry*, 35(4), 613–648. <https://doi.org/10.1111/j.1469-7610.1994.tb01210.x>

- Wylie, K., McAllister, L., Davidson, B., Marshall, J. & Law, J. (2014) Adopting public health approaches to communication disability: challenges for the education of speech-language pathologists. *Folia Phoniatrica et Logopaedica*, 66(4–5), 164–175. <https://doi.org/10.1159/000365752>

## SUPPORTING INFORMATION

Additional supporting information can be found online in the Supporting Information section at the end of this article.

**How to cite this article:** Mulderry, C., Jackson, B.N. & Purdy, S.C. (2024) Children's speech, language and communication skills and parental knowledge in the growing up in New Zealand cohort. *International Journal of Language & Communication Disorders*, 1–15. <https://doi.org/10.1111/1460-6984.13035>