Te Reo Māori: indigenous language acquisition in the context of New Zealand English*

ELAINE REESE

University of Otago, New Zealand

PETER KEEGAN

University of Auckland, New Zealand

STUART MCNAUGHTON

University of Auckland, New Zealand

TE KANI KINGI

Massey University, New Zealand

POLLY ATATOA CARR

University of Waikato, New Zealand

JOHANNA SCHMIDT

University of Waikato, New Zealand

JATENDER MOHAL

University of Auckland, New Zealand

CAMERON GRANT

University of Auckland, New Zealand

AND

SUSAN MORTON

University of Auckland, New Zealand

ABSTRACT

This study assessed the status of te reo Māori, the indigenous language of New Zealand, in the context of New Zealand English. From a broadly representative sample of 6327 two-year-olds (*Growing Up in New Zealand*), 6090 mothers (96%) reported their children understood English, and 763 mothers (12%) reported their children understood Māori. Parents completed the new MacArthur-Bates Communicative Development Inventory short forms for te reo Māori (NZM: CDI sf) and New Zealand English (NZE: CDI sf). Mothers with higher education levels had children with larger vocabularies in both te reo Māori and NZ English. For English speakers, vocabulary advantages also existed for girls, first-borns, monolinguals, those living in areas of lower deprivation, and those whose mothers had no concerns about their speech and language. Because more than 99% of Māori speakers were bilingual, te reo Māori acquisition appears to be occurring in the context of the acquisition of New Zealand English.

INTRODUCTION

Te reo Māori (the Māori language) is one of the official languages of New Zealand and its only indigenous language. Our main aim in this paper is to provide a snapshot of the current state of te reo Māori acquisition among a broadly representative cohort of New Zealand toddlers. It is necessary for us to consider te reo Māori acquisition in the context of the acquisition of New Zealand English, which is the dominant language in New Zealand.

A brief history of te reo Māori

In the early 1800s, when Europeans first began to settle in New Zealand, te reo Māori was a thriving and evolving language. Although a single common language existed throughout both the North and South Islands of New Zealand, at least six dialectal differences amongst iwi (tribes) had also developed as a result of geographical isolation (Harlow, 2007). In 1840, Māori and the British Crown signed the Treaty of Waitangi, which provided the basis for British colonization and the foundations of the new nation. The complexities of the Treaty and translational inaccuracies between the Māori and English versions have subsequently caused

Business, Innovation and Employment, Ministry of Education, Ministry of Justice, Sport New Zealand (previously Sport and Recreation New Zealand), New Zealand Police, Te Puni Kōkiri, Housing New Zealand, Ministry of Pacific Island Affairs, Ministry of Women's Affairs, Department of Corrections, and the Mental Health Commission. Address for correspondence: Elaine Reese, University of Otago – Psychology, PO Box 56, Dunedin 9054, New Zealand. tel: 64 (03) 479 8441; fax: 64 (03) 479 8335; e-mail: ereese@psy.otago.ac.nz

341

numerous challenges (Durie, 1998). For Māori, based on the Māori version of the document, the expectation was that their culture and language would be maintained. The English version was less clear, however, and was interpreted in ways that gave no particular regard to Māori culture and language.

In 1867, the government decreed that only English would be used in the 'Native' schools. Despite these barriers, te reo Māori continued to thrive in Māori homes and in local communities up until the Second World War (see Chrisp, 2005, for a review). Through the late 1880s, new communicable diseases significantly decreased the size of the Māori population, which occurred alongside rapid growth of the non-Māori population. Although it was estimated in 1913 that 90% of Māori children were native speakers of te reo Māori, this was not to last. With the dominance of the non-Māori population came the dominance of the English language, and te reo Māori became more confined to communities that lived in greater isolation. In the 1950s/1960s, however, many Māori migrated from their rural homelands to cities for employment. Government policies to promote integration, such as 'pepper-potting' – dispersing Māori families amongst European neighbourhoods – served to dilute the Māori community, and with it, te reo Māori. The language was soon in dire straits. In a survey conducted in the 1970s, Benton (1991) noted that in only 4·2% of 4090 Māori households was the youngest child fluent in te reo Māori.

A Māori language revival commenced in response to the decline of the language. Māori immersion 'language nests' began in 1982 for preschoolers (te kohanga reo) and in 1985 for school children (kura kaupapa Māori; Tangaere & McNaughton, 2003). In 1987, the Māori Language Act held that the government had an obligation to protect and promote te reo Māori, and established the Māori Language Commission (see Ratima & May, 2011, for a review). These valiant efforts continue, but the language remains at risk, with only 21% of Māori adults now able to hold a conversation about everyday things in Māori, and only 14% of children aged under four considered Māori speakers (Statistics New Zealand, 2014). Of additional concern is the likelihood that these figures themselves are inaccurate, due to being based on global self-report judgements, as opposed to a more objective test or measure. The primary aim of this paper is to assess the state of Māori language acquisition in the new generation of New Zealanders. Our two overarching questions were: (1) Is Māori language regeneration occurring? and (2) If yes, is this regeneration occurring in the context of English language learning?

Indigenous language acquisition: theories and methods

Preservation of indigenous languages is vital for the sustenance of indigenous cultures. As McCarty (2003, p. 148) claimed, "When even one language falls silent, the world loses an irredeemable repository of human knowledge". Some theorists compare protection of indigenous languages to protection of rare flora and fauna (Kelly, Kidd & Wigglesworth, 2015). Yet most of the focus of language acquisition research is on seventy to eighty languages comprising only 1% of the world's languages (Lieven & Stoll, 2010). Te reo Māori is the southernmost of the Pacific languages (Harlow, Keegan, King, Maclagan & Watson, 2009), which make up 18·5% of the world's languages, yet we know little about Pacific language acquisition (Kelly, Kidd & Wigglesworth, 2015; but see Reese *et al.*, 2015).

As is typical of most indigenous languages around the world, te reo Māori is being acquired in the context of a dominant language – New Zealand English. In such situations, the indigenous language is lost rapidly if it is not spoken in homes, schools, and communities (McCarty, 2003; Pearson, 2008). Although te reo Māori is an official language of New Zealand, efforts to teach it as part of the national curriculum in English-medium schools are still limited (Ministry of Education, 2013). Moreover, few families use te reo Māori as their primary language in the home (Statistics New Zealand, 2014). Te reo Māori is thus unlike other Pacific languages in New Zealand (e.g. Samoan and Tongan), which are used as the primary language in the homes of many families with young children. For instance, Reese *et al.* (2015) noted that over 80% of Samoan- and Tongan-speaking two-year-olds in New Zealand were monolingual speakers of the Pacific language.

Instead, te reo Māori is spoken primarily in language immersion schools for children of all ages and adult learners, and in ceremonial contexts such as on the marae (Māori meeting house complex). At the same time, however, many Māori words have become part of the New Zealand vernacular: *whānau* for family group and extended family; *kia ora* for greetings and thanks; *kai* for food; *hangi* for a feast; *hui* for a meeting; *kōrero* for talking or discussing, to name a few. New Zealand English speakers use these words frequently – untranslated – in print and in conversation (Davies & Maclagan, 2006). This incorporation of Māori into New Zealand English prompted us to consider the acquisition of the two languages together, using parallel versions of the same instrument: the MacArthur-Bates Communicative Development Inventory (CDI): Short form (Fenson, Pethick, Renda, Cox, Dale & Reznick, 2000), adapted for te reo Māori and New Zealand English.

Assessing language acquisition in very young children is notoriously difficult, and assessing indigenous language acquisition is even more

343

challenging (see Kelly, Forshaw *et al*., 2015). Kelly *et al*., advocated that it is important to be pragmatic and to choose the best available method at the time for measuring an indigenous language. Fortunately, parents are able to provide reliable and valid reports of their children's vocabulary acquisition in a wide range of languages (see the MacArthur-Bates CDI website at < http://mb-cdi.stanford.edu>). The MacArthur-Bates Communicative Development inventories are the most widely used of the parent report inventories. With permission from the MacArthur-Bates advisory board, we created new versions of the inventory to measure te reo Māori and New Zealand English.

Bilingual development

It is now well established that children exposed to two or more languages take longer to acquire each language than do monolingual speakers (Hoff, Core, Place, Rumiche, Señor & Parra, 2012; Pearson, 2008). Thus, when evaluating bilingual children's language development, it is critical to consider their accomplishments across both languages (e.g. Pearson, Fernandez & Oller, 1993). These assessments reveal that, across both languages, bilingual children's total lexicon is similar to monolingual children's lexicon in their single language (e.g. Hoff *et al*., 2012). Grammatically, when children's word combinations in any language are included, monolingual and bilingual children do not differ (Hoff *et al*., 2012). Yet nearly all of the extant research on bilingual development is based on non-endangered languages, such as Spanish and English, in homes where there are fluent speakers. In the context of a community of dominant English speakers, the acquisition of an endangered indigenous language, such as te reo Māori, could present a different picture of bilingual development. Thus, a primary goal of this paper is to assess bilingual children's development in te reo Māori and New Zealand English.

Demographic factors

When evaluating the current state of te reo Māori in the context of English language development, it is also necessary to establish the current state of New Zealand English with reference to other English dialects. New Zealand English is a distinct dialect from Australian, British, and American English (Hay, Maclagan & Gordon, 2008). In New Zealand, there is a narrower gap between rich and poor compared to the UK and the US, although that gap is widening (OECD, 2014b). In the UK and the US, demographic factors are strong predictors of children's English language acquisition. The strongest of these predictors are socioeconomic class and parents' education levels: children from low-income families and

344

those with lower education levels acquire English at a slower rate than do children from middle-income families and those with higher education levels (Farkas & Beron, 2004; Fernald, Marchman & Weisleder, 2013; Harris, Law & Roy, 2005). These differences in language development are likely due to the 'word gap' by which children in more affluent households hear an estimated 30 million more words on average in the first three years of life compared to children in less affluent households (Hart & Risley, 1995). A less robust language gap is also apparent between girls and boys in many studies of early language acquisition (e.g. Farkas & Beron, 2004; Fenson *et al.*, 2000; Harris *et al.*, 2005; see Reese & Read, 2000, for New Zealand English). In the studies that report gender differences, girls are more advanced than boys in their early vocabulary and grammatical development. We wished to know whether a similar language gap was apparent for children acquiring New Zealand English in families that varied in socioeconomic status and parental education level, and as a function of child gender and other child factors, such as birth order.

The present study

The MacArthur-Bates Communicative Development Inventories (hereafter called the CDI) were developed originally for American English (Fenson *et al.*, 2000), and this is still one of the few languages in which norming studies have been conducted (see Jackson-Maldonado, Thal, Fenson, Marchman, Newton & Conboy, 2003, for a Spanish version). Reese and Read (2000) developed a reliable and valid version of the CDI long form for New Zealand English (the NZ CDI), which is currently being normed (see < kidswords.org>). In the present study, we drew from that version to create a short form version for New Zealand English, which the second author then translated into te reo Māori. We call these new versions the NZE CDI:sf and the NZM CDI:sf.

Ideally, we would have created an adapted version of the CDI for te reo Māori, drawing upon naturalistic language samples of adults' and children's conversation to inform selection of words for the inventory, instead of a direct translation (see Peña, 2007). We used this two-phase process to create New Zealand Samoan and Tongan versions of the inventory (Reese *et al.*, 2015), which Kelly, Forshaw *et al.* (2015) cited as a 'best practice' example of creating tools for measuring indigenous language acquisition. However, we were unable to collect the naturally occurring language samples of te reo Māori necessary for an adaptation, because so few families use it as the dominant language in the home, with wide natural variations in language use and conventions. Thus, in the spirit of pragmatism (Kelly, Forshaw *et al.*, 2015), we decided to use a

345

translated version. One advantage of the translation method is that it allows us to directly compare the English and Māori versions of the same inventory, and to assess the bilingual children's total concepts across the two languages, which is not possible with adapted versions. A disadvantage of the translation method is that the resulting inventories are of different levels of difficulty. For instance, the English inventory contains only two words that are more than two syllables, whereas the translated Māori inventory contains forty-five words that are three syllables or more. However, the inventories were fairly well matched in terms of input frequency, with 56% of the English inventory and 64% of the Māori inventory drawn from the 1000 most frequent words in the respective language (see Appendices A and B).

We then administered the new inventories to a sample of over 6300 mothers enrolled in the *Growing Up in New Zealand* study, a longitudinal birth cohort study with a sample that is broadly representative of the New Zealand population. Before the *Growing Up* cohort children were born, 5% of their mothers described an ability to hold a conversation in te reo Māori (Growing Up in New Zealand, 2015). At the same antenatal time-point, there were 20% or fewer of Māori parents of the *Growing Up* children who described themselves as speaking or understanding spoken te reo Māori well or very well.

At the face-to-face data collection wave conducted when the children were aged two years, a total of 6090/6327 (96%) mothers in the cohort reported that their children understood English, and a total of 763/6327 (12%) mothers reported that their children understood Māori. The inventories were then administered to all mothers who reported that their children understood the relevant language.

Our three main objectives in this analysis were: (1) to assess the current state of te reo Māori language acquisition in the new generation of New Zealanders; (2) in the process, to evaluate the first measure of te reo Māori language development for very young children: the NZM CDI: II short form; and (3) to test the utility of a new NZ English CDI:II short form with a large and diverse sample. Our two main hypotheses were: (1) that Māori language acquisition would be occurring primarily in a bilingual environment, in the context of New Zealand English language acquisition; and (2) that children's scores on the NZM CDI:sf and NZE CDI:sf would vary as a function of demographic factors such as socioeconomic status and parental education as well as children's gender, birth order, and bilingualism. Finally, we also assessed parental concern about children's speech or hearing, which is a powerful indicator of language delay alongside clinical assessments (Klee, Pearce & Carson, 2000). In line with prior research in New Zealand and elsewhere (e.g. Bleses *et al*., 2008; Feldman *et al*., 2005; Harris *et al*., 2005; Horwitz, Irwin, Briggs-Gowan,

346

Heenan, Mendoza & Carter, 2003; Jackson-Maldonado, Thal, Fenson, Marchman, Newton & Conboy, 2013; Reese *et al*., 2015; Reese & Read, 2000; Reilly *et al*., 2009), we predicted that children of parents with higher socioeconomic and educational levels, girls, first-borns, monolinguals, and children for whom parents did not express concern about their child's speech or hearing would have more advanced NZ Māori and/or English language acquisition. We also predicted that children of mothers born in New Zealand would have higher levels of both te reo Māori and English, given their mothers' exposure to both languages. Thus, our focus is primarily on the bilingual sample of children speaking both te reo Māori and English, with reference to the larger cohort of children learning New Zealand English.

METHOD

Participants

Growing Up in New Zealand is a comprehensive longitudinal study of 6853 children comprising an ethnically and socioeconomically diverse sample (Morton *et al*., 2012), with mothers and their partners recruited before the children were born in 2009 and 2010 (see Morton *et al*., 2013, for the cohort profile). At the data collection point completed when the children were approximately 24 months old, complete data were available for 6327 children, for whom 6090 (96%) mothers said their child could understand English, and 763 (12%) mothers said their child could understand Māori. Of the 6090 mothers who said their child could understand English, 6025 (99%) mothers were able to complete the checklist for their children in English, without interpreter or interviewer assistance. Of the 763 mothers who said their child could understand Māori, 584 (77%) mothers were able to complete the checklist for their children in Māori, without interpreter or interviewer assistance. All further analyses focus on the 6025 children whose mothers were able to complete the checklist in English and the 584 children whose mothers were able to complete the checklist in Māori. For 581 of the Māori-speaking children, mothers also completed the checklist in English, so this subsample comprised the focus of our bilingual analyses. As part of the broader *Growing Up in New Zealand* study, additional information relevant to language development is available. This information includes child gender, birth order, ethnicity, maternal education and birthplace, and family socioeconomic status. Mothers reported on child ethnicity using a total response method (Statistics New Zealand, 2005), in which they nominated all ethnicities for the child. Thus, these responses could add up to over 100%. Maternal education was coded into five subcategories of the highest level of education completed: intermediate; high school; trade certificate/diploma; bachelor's degree;

347

postgraduate degree. Socioeconomic status was coded into three levels according to the 2006 New Zealand Index of Deprivation, a well-validated area-level measure of socioeconomic deprivation derived from 2006 census data on eight socioeconomic dimensions (Salmond, Crampton & Atkinson, 2007). Maternal birthplace is of interest because mothers born in New Zealand would have grown up with at least some exposure to both te reo Māori and New Zealand English. Table 1 shows the demographics of the final sample for each inventory.

Procedure

The assessment was conducted as part of the *Growing Up in New Zealand* 90-minute face-to-face computer-assisted interview with participating mothers. Mothers first indicated all of the languages their child could understand. For each of these languages, in keeping with the computer-assisted procedure, interviewers provided a showcard to participants with the numbered list of words for that language (see Appendices A and B for the lists in English and Māori). As with all CDI: II versions for children of this age, we assessed only their expressive vocabulary, not their receptive vocabulary. We adapted the standard CDI: II short form instructions (Fenson *et al*., 2000) slightly for the computer-assisted procedure: *Children understand many more words than they say. With this question, we are particularly interested in the words your child SAYS. Please look at this list and tell me the numbers for the words you have heard* [*Child's name*] *use. If* [*Child's name*] *uses a different pronunciation of a word (e.g. "sketti" instead of "spaghetti", still tell me the number for that word. Remember that this is a list of all the words that are used by many different children – don't worry if your child only uses a few of these words.* The interviewer then entered the participant's response for each numbered word on each showcard. After completing the checklist in all languages the mother indicated that her child understood, the interviewer asked the word combination question in English (*Has your child begun to combine words yet, such as 'nother cookie' or 'doggie bite'?;* Fenson *et al*., 2000), with options of 'not yet', 'sometimes', and 'often'. Interviewers instructed mothers to respond based on all languages the child spoke, including non-English languages. Immediately after completing the word combination question, mothers answered a question about whether or not they had any concerns about their child's speech or hearing. If they expressed a concern, they were asked to classify the type of concern (see Appendix C) and to classify how concerned they were, from not concerned at all to very concerned. They were also asked if they had sought any professional advice or treatment regarding their child's speech and/or understanding.

348

TABLE 1. *Demographics of families responding to the New Zealand English and Māori CDI:II short forms*

	English speakers N = 6025	Māori speakers N = 584
Child gender (% male)	52	50
Birth order (% first-born)	42	43
Bilingual status (% monolingual)	81	<1
Child ethnicity (total response)		
European (%)	72	64
Māori (%)	24	81
Maternal education (highest level)		
Intermediate school (%)	7	12
High-school qualification (%)	23	26
Trade certificate/diploma (%)	30	36
Bachelor's degree (%)	23	16
Postgraduate degree (%)	17	9
Maternal birthplace (% born in NZ)	68	93
Area-level deprivation		
Most deprived (%)	34	49
Moderately deprived (%)	36	36
Least deprived (%)	27	13
Maternal concern about child's speech or hearing (%)	6	8

RESULTS

Because our focus is primarily on the new te reo Māori inventory, we report analyses first for te reo Māori and second for New Zealand English. For New Zealand English, we report analyses first for the bilingual Māori–English sample (N = 581) and second for the full cohort (N = 6025). Analyses were conducted using SPSS Statistics version 22.

Psychometric properties

The reliability of each inventory was assessed using Cronbach's alpha, which estimates the inter-item correlations for each scale. The Cronbach's alphas were excellent at 0·96 for the Māori scale, 0·98 for the English scale with the bilingual subsample, and 0·98 for the English scale with the full cohort. Corrected item-total correlations for the Māori scale were all above 0·20 except for *me ow* 'meow' (0·09), *kia ora* 'thank you' (0·19), *takune* 'pretend' (0·17), and *ueue* 'shake' (0·16). Corrected item-total correlations for the English scale with the bilingual sample were all above 0·20 except for *hi* (0·17), and with the full cohort were all above 0·30. There were only three monolingual Māori speakers in the sample (once children whose mothers required interpreter or interviewer assistance were excluded), so reliability was not conducted separately for the Māori scale as a function of bilingualism. On the English scale for the full cohort, Cronbach's

349

alphas were 0·98 for both monolinguals and bilinguals. These high reliabilities are all in line with those for the English CDI:II short forms (Fenson *et al.*, 2000). Thus, the two inventories both exhibited high levels of internal reliability.

Vocabulary

Table 2 contains the mean vocabulary scores for the full samples (monolinguals plus bilinguals) for the NZM CDI:IIsf and NZE CDI:IIsf inventories as a function of child gender, birth order, ethnicity, bilingual status, maternal education, area-level deprivation, maternal birthplace, and maternal concerns about the child's speech or hearing. Table 3 contains the mean vocabulary scores for both inventories for the Māori–English bilingual subsample. Table 4 contains the percentile rankings for 24-month-old girls and boys for both inventories, and for monolingual and bilingual English speakers. These tables show the raw score values for every 10th percentile level from the 10th to the 90th percentile. For instance, a raw score of 48 on the English inventory for a 24-month-old bilingual girl would place her at the 60th percentile. In the following analyses, first on the Māori–English bilingual sample and next on the full cohort, we conducted one-way ANOVAs on each demographic factor followed up by Bonferroni or Tamhane's post-hoc tests as appropriate.

Māori bilingual speakers. For Māori bilingual speakers, the average total Māori vocabulary was 4 words (median = 1), with a range from 0 to 78 words. The most common words were: *tepu* ('bench', 17%), *inu reka* ('fizzy drink', 14%), *pai* ('like' or 'good', 13%), *waewae* ('leg', 13%), *nui* ('much' or 'big', 11%), *manu* ('bird', 11%), (see Appendix B). Māori vocabulary did not vary significantly on most demographic dimensions (see Table 3). However, Māori vocabulary differed by child ethnicity ($F(1,556) = 16·68$, $p < ·001$, $\eta_p^2 = 0·03$), with Māori children having higher Māori vocabulary scores than non-Māori children. Māori vocabulary also varied as a function of maternal education ($F(4,571) = 3·84$, $p = ·004$, $\eta_p^2 = 0·03$), although Tamhane's tests did not reveal significant pairwise differences among the children of mothers with different educational qualifications. Finally, there was a difference as a function of mothers' birthplace ($F(1,578) = 5·63$, $p < ·02$, $\eta_p^2 = 0·01$), with children of mothers born in NZ having higher Māori vocabulary than children of mothers born outside NZ. Note, however, the small number of mothers born outside NZ (see Table 1).[1]

When all of the significant variables were entered simultaneously in a regression analysis, the model accounted for 6% of the variance in Māori

[1] We conducted these analyses again including the monolingual Māori speakers, and again with only the Māori speakers of Māori ethnicity, and the results were identical in both cases.

350

TABLE 2. *Mean vocabulary (and SD) and word combination scores on the NZ English (N = 6025) and NZ Māori (N = 584) CDI Short Forms as a function of demographics*

	English vocabulary total words, mean (SD)	English grammar (% not yet combining)	Māori vocabulary total words, mean (SD)	Māori grammar (% not yet combining)
Child gender				
Girl	51 (27)	9	4 (8)	5
Boy	43 (26)	16	5 (10)	13
Birth order				
First-born	49 (27)	11	4 (7)	11
Later-born	45 (26)	13	5 (10)	8
Bilingual status				
Monolinguals	49 (27)	12	–	–
Bilinguals	39 (25)	15	5 (9)	9
Child ethnicity				
European	52 (26)	11	–	–
Non-European	34 (25)	17	–	–
Māori	–	–	5 (10)	1
Non-Māori	–	–	1 (3)	7
Maternal education				
Intermediate	40 (25)	17	3 (5)	19
High-school	42 (26)	14	4 (7)	11
Trade certificate	45 (26)	13	4 (7)	5
Bachelor's	52 (26)	11	6 (13)	8
Postgraduate	53 (27)	10	9 (15)	10
Area-level deprivation				
Least	52 (25)	10	3 (7)	7
Moderate	49 (26)	13	5 (10)	8
Most	40 (26)	14	5 (9)	11
Maternal birthplace				
Born in NZ	50 (26)	11	5 (9)	9
Born outside NZ	41 (27)	15	1 (2)	14
Maternal concern about child's speech or hearing				
Not concerned	48 (27)	11	5 (9)	8
Concerned	30 (20)	30	3 (6)	27

NOTE: Means are not presented for monolingual Māori speakers because of low cell sizes (< 5).

vocabulary ($F_{(3,550)}$ = 12·29, $p <$ ·001). All three factors remained unique predictors of Māori vocabulary (βs ranged from −0·10 to 0·18, all ps < ·001). Māori children, children of mothers with higher levels of education, and children whose mothers were born in New Zealand had higher Māori vocabularies.

English speakers: bilingual subsample. For Māori–English bilingual speakers, the average total English vocabulary was 38 (median = 33), with a range from 0 to 100 words. The most common words were: *mum* (93%),

351

TABLE 3. *Māori–English bilingual sample (N = 581): mean vocabulary (and SD) and word combination scores on the NZ Māori and NZ English CDI Short Forms as a function of demographics*

	Māori vocabulary total words, mean (SD)	English vocabulary total words, mean (SD)	Total concepts, mean (SD)	Word combinations (% not yet combining)
Child gender				
Girl	4 (8)	41 (25)	46 (22)	5
Boy	5 (10)	34 (23)	39 (21)	13
Birth order				
First-born	4 (7)	39 (25)	43 (23)	11
Later-born	5 (10)	36 (24)	41 (21)	8
Child ethnicity				
European	4 (8)	41 (25)	45 (22)	8
Non-European	6 (10)	29 (20)	36 (18)	11
Māori	5 (9)	35 (23)	40 (20)	9
Non-Māori	1 (3)	52 (27)	53 (26)	7
Maternal education				
Intermediate	3 (5)	34 (24)	38 (23)	19
High-school	4 (7)	39 (25)	43 (23)	11
Trade certificate	4 (7)	38 (23)	42 (20)	5
Bachelor's	5 (11)	39 (26)	44 (23)	9
Postgraduate	9 (15)	35 (27)	44 (22)	10
Area-level deprivation				
Least	3 (7)	42 (24)	45 (22)	7
Moderate	5 (10)	41 (26)	46 (22)	8
Most	5 (9)	33 (23)	38 (20)	11
Maternal birthplace				
Born in NZ	5 (9)	37 (24)	42 (21)	9
Born outside NZ	1 (2)	46 (27)	48 (26)	14
Maternal concern about child's speech or hearing				
Not concerned	5 (9)	39 (25)	43 (22)	8
Concerned	3 (6)	25 (18)	27 (18)	27

bye (90%), *no* (89%), *shoe* (88%), *ball* (87%), *car* (86%), *hi* (86%), *thank you* (81%), and *hot* (80%) (see Appendix A). English vocabulary differed significantly as a function of child gender ($F(1,579) = 12.79$, $p < .001$, $\eta_p^2 = 0.02$), with girls having higher vocabulary scores than boys (see Table 3). English vocabulary also differed as a function of child ethnicity, with European children having higher English vocabularies than non-European children (including Māori, Pacific, Asian, and other non-European) ($F(1,556) = 32.69$, $p < .001$, $\eta_p^2 = 0.06$). English vocabulary also differed as a function of deprivation index ($F(2,562) = 8.64$, $p < .001$, $\eta_p^2 = 0.03$). Children living in the most deprived areas (NZ Deprivation deciles 8–10) had lower vocabulary scores than children in either moderately deprived (deciles 4–6) or least deprived areas (deciles 1–3), who did not differ from

TABLE 4. *Percentile rankings for vocabulary scores on the NZ English and Māori CDI:II Short Forms*

Percentile ranking	English monolingual total words		English bilingual total words		Māori bilingual total words	
	Girls	Boys	Girls	Boys	Māori	Non-Māori
10th	15	11	10	7	0	0
20th	26	19	18	13	0	0
30th	36	27	25	20	0	0
40th	45	35	32	26	1	0
50th	53	43	41	31	1	0
60th	61	51	48	37	2	0
70th	70	61	57	45	4	0
80th	79	71	67	54	7	1
90th	88	83	80	72	16	3

NOTE: The rankings for English bilingual speakers are based on all bilingual speakers in the full cohort (n = 1145).

each other. English vocabulary also differed as a function of mothers' birthplace ($F(1,578) = 5.78$, $p < .05$, $\eta_p^2 = 0.01$), with children of mothers born in NZ having higher English vocabulary scores than children of mothers born outside NZ. Finally, English vocabulary varied as a function of maternal concern ($F(1,575) = 14.31$, $p < .001$, $\eta_p^2 = 0.02$). Children whose mothers expressed concern had lower vocabulary scores than children whose mothers expressed no concern about speech or hearing.

When all of these significant factors were entered simultaneously in a regression analysis, the model accounted for 11% of the variance in English vocabulary ($F(5,540) = 12.92$, $p < .001$). All factors remained significant (βs ranged from −0.12 to 0.20, all ps < .01), except for mothers' birthplace, which became marginally significant ($\beta = 0.08$, $p = .06$), suggesting that each factor contributes uniquely to children's English vocabulary. Girls, European children, children whose families live in less deprived areas, and whose mothers did not have concerns about their child's speech or hearing all had higher English vocabulary scores.

English speakers: Full cohort. The same pattern of significant findings for English vocabulary was evident in the full cohort, with additional significant findings for birth order ($F(1,6012) = 28.32$, $p < .001$, $\eta_p^2 = 0.005$), bilingualism ($F(1,6019) = 137.42$, $p < .001$, $\eta_p^2 = 0.02$), and maternal education ($F(4,5998) = 48.15$, $p < .001$, $\eta_p^2 = 0.03$). First-borns, monolinguals, and children of mothers with a tertiary degree also had higher English vocabulary scores than later-borns, bilinguals, and children of mothers without a tertiary degree (see Table 2). The final regression model accounted for 14% of the variance in

353

English vocabulary ($F(8,5792) = 114{\cdot}51$, $p < {\cdot}001$), and all seven factors remained significant predictors (βs ranged from $-0{\cdot}16$ to $0{\cdot}13$, all ps $< {\cdot}001$).

Summary of vocabulary findings. Thus, there were some similar patterns for vocabulary knowledge across the two languages in the bilingual sample as a function of demographics, with parallel differences across the two languages as a function of children's ethnicity: Māori children had higher Māori vocabularies than non-Māori children, and European children had higher English vocabularies than non-European children. The Māori–English bilingual speakers' English vocabulary also differed as expected as a function of child gender, deprivation status, mothers' birthplace, and mothers' speech/language concerns. In the full cohort, all demographic factors significantly predicted children's English vocabulary, with the strongest effects for ethnicity ($\eta_{\mathrm{p}}^2 = 0{\cdot}09$) and deprivation status ($\eta_{\mathrm{p}}^2 = 0{\cdot}04$). Yet there were some different patterns between the two languages in the bilingual sample, with maternal education significantly predicting children's Māori vocabulary but not their English vocabulary. Note, however, that maternal education was a significant predictor of children's English vocabulary in the full cohort.

Bilingual children's total concepts

Because vocabulary estimates in only one language underestimate bilingual children's language development (e.g. Marchman, Martínez-Sussman & Dale, 2004; Pearson *et al.*, 1993), we next conducted an analysis of the Māori–English bilingual children's total concepts across the two languages. For this analysis, children were credited as possessing the concept if they produced the word for that concept in either language. These analyses were conducted only on data from the Māori–English bilingual children (N = 581; see Table 3).

Bilingual girls had more total concepts across the two languages than bilingual boys ($F(1,578) = 15{\cdot}64$, $p < {\cdot}001$, $\eta_{\mathrm{p}}^2 = 0{\cdot}03$). Total concepts also differed as a function of child ethnicity ($F(1,556) = 27{\cdot}44$, $p < {\cdot}001$, $\eta_{\mathrm{p}}^2 = 0{\cdot}05$). Bilingual non-Māori children had more total concepts than bilingual Māori children. Moreover, bilingual children's total concepts differed as a function of deprivation status ($F(2,562) = 8{\cdot}49$, $p = {\cdot}001$, $\eta_{\mathrm{p}}^2 = 0{\cdot}03$), with children in the most deprived areas having fewer concepts than children in moderately or less deprived areas. Bilingual children's total concepts also differed by maternal concern for speech or hearing ($F(1,578) = 22{\cdot}33$, $p < {\cdot}001$, $\eta_{\mathrm{p}}^2 = 0{\cdot}04$). Bilingual children whose mothers had concerns about their speech or hearing had fewer total concepts than bilingual children whose parents had no concerns.

When all of these significant variables were entered into a regression, the model accounted for 11% of the variance in bilingual children's total

354

concepts ($F_{(4,544)} = 17 \cdot 18$, $p < \cdot 001$). All of the variables remained unique predictors of children's total concepts (βs ranged from $-0 \cdot 20$ to $0 \cdot 12$, all ps $< \cdot 01$). Girls, non-Māori children, children in moderately or less deprived areas, and those whose mothers did not have speech/hearing concerns had more total concepts across the two languages.

Word combinations

Mothers' responses to the word combination question were retained as 'not yet', 'sometimes', and 'often' for analyses. The same set of univariate ANOVAs was conducted on the word combination question, separately for Māori and English speakers (first for the bilingual sample and then for the full cohort), as a function of child gender, birth order, bilingual status, child ethnicity, maternal education, area-level deprivation, maternal birthplace, and maternal concern for their children's speech or language (see Tables 2 and 3).

Māori–English speakers. Note that the word combination question did not specify in which language children were combining words, so mothers' answers could have been with respect to any language. Word combinations for Māori–English bilingual speakers varied as a function of child gender ($F_{(1,579)} = 25 \cdot 15$, $p < \cdot 001$, $\eta^2_p = 0 \cdot 04$) and maternal speech/hearing concerns ($F_{(1,574)} = 32 \cdot 59$, $p < \cdot 001$, $\eta^2_p = 0 \cdot 05$).

When these two significant variables were entered together in a regression analysis, the model accounted for 9% of the variance in Māori–English speakers' word combinations ($F_{(2,573)} = 28 \cdot 32$, $p < \cdot 001$). Both variables remained significant in the multivariable model (βs were $0 \cdot 19$ for gender and $-0 \cdot 22$ for maternal concerns, ps $< \cdot 001$). Thus, Māori–English bilingual speakers were more likely to combine words when they were girls, or children of mothers who did not express concerns about their speech and hearing.

Full cohort. For the full cohort of English speakers, word combinations also varied as a function of child gender ($F_{(1,6007)} = 118 \cdot 45$, $p < \cdot 001$, $\eta^2_p = 0 \cdot 02$), with girls more likely to be combining words than boys. There were also differences by child birth order ($F_{(1,5999)} = 15 \cdot 90$, $p < \cdot 001$, $\eta^2_p = 0 \cdot 003$), bilingual status ($F_{(1,6006)} = 46 \cdot 31$, $p < \cdot 001$, $\eta^2_p = 0 \cdot 01$), child ethnicity (European vs. non-European) ($F_{(1,5862)} = 34 \cdot 23$, $p = \cdot 00$, $\eta^2_p = 0 \cdot 01$), maternal education ($F_{(4,5985)} = 16 \cdot 98$, $p = \cdot 00$, $\eta^2_p = 0 \cdot 01$), household deprivation index ($F_{(2,5865)} = 28 \cdot 61$, $p < \cdot 001$, $\eta^2_p = 0 \cdot 01$), maternal birthplace ($F_{(1,6006)} = 23 \cdot 66$, $p < \cdot 001$, $\eta^2_p = 0 \cdot 004$), and maternal concern ($F_{(1,5952)} = 216 \cdot 62$, $p < \cdot 001$, $\eta^2_p = 0 \cdot 04$). First-borns, monolingual children, European children, children of mothers with higher levels of education, children living in households in less deprived areas, and children of mothers born in New Zealand were more likely to be

355

combining words. Mothers who expressed speech or hearing concerns had children who were less likely to combine words.

When all of these significant variables were entered together in a regression analysis, the model accounted for 7% of the variance in English speakers' word combinations ($F(8,5749) = 46·70$, $p < ·001$). All variables remained significant in the multivariable model (βs ranged from −0·10 to 0·18, all ps < ·001), except for child ethnicity ($p = ·07$) and bilingual status ($p = ·06$). English speakers were more likely to combine words when they were girls, first-borns, children of mothers with higher levels of education, children in households in less deprived areas, children whose mothers were born in New Zealand, and children whose mothers did not express concerns about their speech and hearing.

Bilingual children's vocabulary and grammar development. Our final analysis assessed links within and across Māori and English between children's vocabulary and grammar development (see Hoff *et al*., 2012). The correlation between Māori and English vocabulary for bilingual children was $r = −0·49$, $p < ·001$. Bilingual children who knew more English words knew fewer Māori words. Whereas there was a significant positive correlation between their English vocabulary and word combinations ($r = 0·43$, $p < ·001$), and between their total concepts in both languages and word combinations ($r = 0·49$, $p < ·001$), there was no correlation between their Māori vocabulary and word combinations ($r = 0·01$, n.s.). Thus, vocabulary and grammar for the bilingual children were only related within their English language scores, and not within te reo Māori. This pattern could be because of the low overall rate of Māori vocabulary, or because the word combination question – with its English examples – may have prompted mothers to respond with respect to their children's grammatical development in English.

DISCUSSION

Our first question was whether Māori language regeneration is occurring in the new generation of New Zealanders. Based on our findings, we believe the answer is a qualified 'yes'. This study found that the mothers of 12% of a cohort of two-year-olds described that their children understood Māori. There were 9% of this cohort whose mothers reported that their child was speaking te reo Māori at age two years and who could provide a vocabulary score. We note that the average Māori vocabulary score for these speakers is low, and that nearly half (49%) of the Māori-speaking children are growing up in the most deprived neighbourhoods in New Zealand. It is encouraging, however, that Māori and non-Māori children alike are learning te reo Māori. In fact, when mothers were allowed to nominate more than one ethnicity for their children, 81% of the Māori

356

speakers were of Māori ethnicity, and 64% of the Māori speakers were of European ethnicity. Using this same method, 23% of the Māori speakers were of Pacific ethnicity, and 5% of Asian ethnicity. Māori-speaking children of Māori ethnicity were stronger speakers of the language than non-Māori children. Most likely this effect is due to greater te reo Māori input in Māori homes. We are continuing to assess the home language environment and children's te reo Māori knowledge at later ages in the *Growing Up in New Zealand* study, so we will be able to explore whether these trends continue or increase as children grow older.

Our next question was whether regeneration is occurring in the context of English language learning. With 99·3% of Māori speakers being bilingual, and 99·5% of those children being English–Māori bilinguals, it is clear that Māori language acquisition is occurring primarily in the context of English language acquisition. Moreover, for the bilingual children, English may already be dominating their Māori language acquisition, as noted by the children's relatively greater proficiency in English than in Māori, and the negative correlation between their English and Māori vocabulary. In future data collection points in the study, we will be able to get a better sense of the bilingual children's relative use and fluency of each language as a function of their home and school environments. The influence of English on the Māori language is strong, but the Māori language is also influencing NZ English. A growing number of Māori words are part of the New Zealand English dialect (see Davies & Maclagan, 2006). This trend should ultimately strengthen the Māori language revival, as long as the growth continues and is not restricted to a limited number of words and phrases.

A primary objective of this study was to evaluate a new measure of Māori language development for young children: the NZM CDI: II short form, developed for *Growing Up in New Zealand*. The initial results are encouraging. Reliability for the Māori inventory is high and, in line with our second hypothesis, some of the expected demographic indicators held (maternal education and ethnicity) but not others (child gender, birth order, deprivation). Although children of mothers with higher levels of education are more likely to know Māori words, which could suggest it is an elite phenomenon, the finding that 85% of Māori speakers are living in moderately to highly deprived areas does not fit with this interpretation.

The analysis of the total concepts of bilingual speakers across Māori and English was more informative than the analysis of their total vocabulary in Māori. For instance, when analyzing their total concepts, the expected differences by gender, deprivation status, and maternal concern emerged. These findings are consistent with demographic trends for English and other languages (e.g. Farkas & Beron, 2004; Jackson-Maldonado *et al*., 2013; Klee *et al*., 2000). Thus, we recommend that the Māori tool is

357

always used in the context of the English tool for Māori–English bilingual speakers, and that total concepts across the two languages are calculated in addition to total vocabulary in each language (Hoff *et al*., 2012; Marchman *et al*., 2004; Pearson *et al*., 1993).

Finally, nearly a quarter (23%) of mothers who said their children understood Māori were not able to complete the inventory without interpreter or interviewer assistance. There are a number of possible reasons for the high rate of non-completion of the Māori inventory. We speculate that a key reason is that because te reo Māori is an official language of New Zealand, some children are likely to be learning te reo Māori in early childhood education settings rather than in the home setting. We also know that one quarter of all children in the *Growing Up in New Zealand* study are living with extended families (over one third of Māori children; Morton *et al*., 2010), and therefore their te reo Māori knowledge may come from a grandparent. In these cases, the parent knows that the child speaks some Māori words but does not know the extent of their child's te reo Māori knowledge, or does not know enough Māori themselves to complete the inventory without assistance. We recommend that multiple informants (parents as well as teachers and grandparents) complete the inventories for Māori speakers whenever possible. We will also be able to determine te reo Māori fluency directly from the *Growing Up in New Zealand* children themselves at later data collection waves.

Our second objective was to test the utility of a new NZ English CDI:II short form with a large and ethnically diverse sample. The findings here are clear that the NZE CDI:IIsf should be a useful alternative to the NZE CDI:II long form (Klee, Stokes, Reese, Jørgensen & Bleses, 2012–2013; Reese & Read, 2000). We obtained similar patterns on the vocabulary portion of the inventory to prior research in English and other languages demonstrating advantages for girls (Bleses *et al*., 2008; Feldman *et al*., 2005; Harris *et al*., 2005; Jackson-Maldonado *et al*., 2013; Reese & Read, 2000; Reilly *et al*., 2009), first-borns (Reilly *et al*., 2009), monolinguals (Reese *et al*., 2015; Reilly *et al*., 2009), children of more educated parents (Feldman *et al*., 2005; Harris *et al*., 2005; Horwitz *et al*., 2003; Reilly *et al*., 2009), children in less deprived households (Horwitz *et al*., 2003; Jackson-Maldonado *et al*., 2013; Reese *et al*., 2015), and children whose parents did not express concerns about their speech or hearing (Harris *et al*., 2005; Horwitz *et al*., 2003; Klee *et al*., 2000). The average vocabulary and word combination scores for our English speakers are somewhat lower than comparable average scores for 24-month-olds in the original American norming sample (see Fenson *et al*., 2000), but that sample was not as diverse – ethnically or in terms of maternal education levels – as the *Growing Up in New Zealand* sample. Overall, the effect sizes for the demographic factors we obtained with the full cohort ranged from

small to medium, with the strongest factors being ethnicity and socioeconomic status. These effects are similar in type to those obtained with other samples (Hart & Risley, 1995; Hindman, Wasik & Snell, 2016; Hirsh-Pasek *et al.*, 2015), although they are not as large as those obtained in some English- and non-English-speaking samples (e.g. Farkas & Beron, 2004; Schady *et al.*, 2015). Although the gap between rich and poor is widening in New Zealand, socioeconomic disparities are not yet as great as in some other countries (OECD, 2014a, 2014b).

Future analyses with this sample will address the predictive validity of the short form for children's complex language and literacy development, and as a function of antenatal and infant factors on the larger study. It will be particularly important to address the vocabulary gaps in New Zealand English and in Māori as a function of socioeconomic status and parental education. At age two years, children growing up in less deprived areas knew on average 12% more English words than children in the most deprived areas, and children of mothers with a bachelor's degree knew 10% more English words than children of mothers with a high school diploma. Moreover, there was a sizeable gender gap, with girls knowing on average 8% more English words than boys. Although these gaps sound small, they portend critical differences in children's complex language and reading skills later in life (Hindman *et al.*, 2016). For instance, there is a gender gap in New Zealand children's reading achievement in primary school that mirrors these early language differences, with 83% of girls and 74% of boys achieving at or above the expected levels in reading (New Zealand Ministry of Education, 2014). In future analyses, we will also be able to address whether these vocabulary gaps narrow or widen with age. Finally, we will be able to trace the origins of these gaps in terms of parent–child interactions and childcare experiences in the first two years of life, alongside biological contributors.

The results for the word combination question, whether for English or Māori speakers, were also in line with prior research on syntactic development (see Harris *et al.*, 2005; Reilly *et al.*, 2009), but overall were weaker than the findings for vocabulary. Regardless of which language children spoke, mothers reported that most of their two-year-old children were combining words (87% of English speakers and 91% of Māori speakers). English and Māori speakers were more likely to combine words when they were girls, children of mothers with higher educational qualifications, and children of mothers who did not express concerns about their speech and hearing. English speakers were also more likely to combine words if they were first-borns, if they were growing up in households in less deprived areas, and if they had mothers who were born in New Zealand. The word combination question is important for language-delay screening purposes (Klee *et al.*, 2000), but may be more

359

useful for revealing individual differences with children younger than 24 months.

Strengths, limitations, and future directions

The direct translation of the Māori inventory from English conferred the benefit of being able to compare directly across the two inventories, and to create a measure of children's total concepts across the two languages for these words. However, direct translations also have inherent limitations (see Peña, 2007). To start with, some concepts do not translate directly between the two languages. For instance, whereas in English there are separate words for the concepts 'hello' and 'thank you', in Māori these two concepts share the same word (*kia ora*). Thus we had to list the same Māori word twice in four instances (*kia ora* for 'hi / thank you'; *pereti* for 'plate/tray'; *mātou* for 'our/us'; *raro* for 'down/under'). Because children who knew these words got credited twice, this practice could have slightly inflated the children's vocabularies in Māori. For other English words on the inventory, the Māori version is the same as the English (*me ow/meow*). This practice again could have inflated the children's vocabularies in Māori, such that if they knew the English word, they would also get credit for that same word in Māori. Finally, a word in Māori may be more difficult for children phonologically than the English equivalent, or less frequent in the input, rendering it a more conservative measure of their vocabulary in that language. For instance, nearly all the words on the English inventory are one or two syllables, with the only exceptions being *aeroplane* and *tomato sauce*. (Of course, *airplane* would also be counted as correct for *aeroplane*, and *sauce* was counted as correct for *tomato sauce*.) In contrast, the Māori inventory contained forty-five words that were three syllables or more. Although the inventories were well matched in terms of input frequency (see Appendices A and B), we would argue that, overall, the Māori inventory was more difficult than the NZ English inventory.

For other language inventories in the *Growing Up* study, we have instead created adaptations that take item difficulty and input frequency into account (see Reese *et al*., 2015). We hope that an adapted version of the Māori inventory can eventually be developed, based on naturally occurring speech and experimental probes, both in the home and in Māori-immersion classrooms (see Kelly, Forshaw *et al*., 2015).

At present, however, it is rare for New Zealand parents to be fluent speakers of te reo Māori, and even rarer for parents to speak to their children solely or primarily in te reo Māori in the home (Growing Up in New Zealand, 2015). Chrisp (2005) noted that, in 2001, only 27% of Māori children were being raised by adults fluent in te reo Māori. Only

three children in this analysis could be considered monolingual speakers of Māori at age two years. The future of te reo Māori depends upon this generation of New Zealand children and their parents, grandparents, and teachers acquiring and using Māori in everyday speech, at home, and in educational settings (Bishop, 2003; Durie, 1998; May, 1999; Rau, 2005; Timitimu, Ormsby-Teki & Ellis, 2009). It is encouraging that 46% of Māori families with children in the household use at least some te reo Māori at home (Statistics New Zealand, 2014). Within the *Growing Up* cohort, 40% of those children identified as Māori were also described as being able to understand te reo Māori at age two years (Growing Up in New Zealand, 2015). On another positive note, the fact that Māori and non-Māori children are acquiring te reo Māori offers some optimism that the language will survive as a *taonga* ('treasure') for all New Zealanders, not solely as a language for Māori (see McCarty, 2003, for the status of Native American languages).

On a practical note, we encourage practitioners in New Zealand to assess both languages for bilingual children, and to rely on the percentile scores for bilingual rather than monolingual children when interpreting their results (see Table 4). We also highlight that maternal concern for children's speech or hearing emerged as a powerful indicator of English speakers' total vocabulary and their word combinations, and for Māori speakers' word combinations and total concepts across the two languages (cf. Harris *et al.*, 2005; Klee *et al.*, 2000). Asking parents to offer a simple "yes" or "no" as to whether they have concerns about their children's speech or hearing should serve as an easy-to-administer indicator in the GP's office, perhaps accompanied by the word combination question. In future, however, we recommend that the word combination question is asked separately for each language the child speaks.

CONCLUSIONS

What is the current state of Māori language acquisition in the new generation of New Zealanders? Although we cannot pronounce the language to be in the peak of health, we are encouraged to find that Māori and European children alike are learning both languages, thus upholding the bicultural principle on which New Zealand is founded. Much work needs to be done, however, to ensure the survival of te reo Māori in future generations. Considering ways to promote the language are beyond the scope of this paper, but we hope that the tool we have developed to measure young children's Māori language competence will be useful for speech–language professionals, and will further encourage New Zealand parents and early childhood teachers to enhance their own use of te reo Māori.

361

REFERENCES

Benton, R. (1991). *The Māori language: dying or reviving?* Honolulu, HI: East-West Center.

Bishop, R. (2003). Changing power relations in education: Kaupapa Māori messages for 'mainstream' education in Aotearoa/New Zealand. *Comparative Education* **39**, 221–38.

Bleses, D., Vach, W., Slott, M., Wehberg, S., Thomsen, P., Madsen, T. O. & Basbøll, H. (2008). The Danish Communicative Developmental Inventories: validity and main developmental trends. *Journal of Child Language* **35**, 651–69.

Chrisp, S. (2005). Māori intergenerational language transmission. *International Journal for the Sociology of Language* **172**, 149–81.

Davies, C. & Maclagan, M. (2006). Māori words – read all about it: testing the presence of 13 Māori words in four New Zealand newspapers from 1997 to 2004. *Te reo* **49**, 73–99.

Durie, M. (1998). *Te mana, te kāwanatanga: the politics of Māori self-determination.* Auckland: Oxford University Press.

Farkas, G. & Beron, K. (2004). The detailed age trajectory of oral vocabulary knowledge: differences by class and race. *Social Science Research* **33**, 464–97.

Feldman, H. M., Dale, P.S., Campbell, T. F., Colborn, D. K.Kurs-Lasky, M., Rockette, H. E. & Paradise, J. L. (2005). Concurrent and predictive validity of parent reports of child language at ages 2 and 3 years. *Child Development* **76**, 856–68.

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**, 95–116.

Fernald, A., Marchman, V. A. & Weisleder, A. (2013). SES differences in language processing skill and vocabulary are evident at 18 months. *Developmental Science* **16**, 234–48.

Growing Up in New Zealand (2015). Growing Up in New Zealand Policy Brief. *The intergenerational use of te reo Māori: evidence from Growing Up in New Zealand.* Auckland: Growing Up in New Zealand.

Harlow, R. (2007). *Māori: a linguistic introduction.* Cambridge: Cambridge University Press.

Harlow, R., Keegan, P., King, J., Maclagan, M. & Watson, C. (2009). The changing sound of the Māori language. In J. N. Stanford & D. R. Preston (eds), *Variation in indigenous minority languages, 25*, 129–52. Amsterdam: John Benjamins Publishing.

Harris, F., Law, J. & Roy, P. (2005). *The third implementation of the Sure Start language measure.* London: Department for Education and Skills.

Hart, B. & Risley, T. R. (1995). *Meaningful differences in the everyday experience of young American children.* Baltimore, MD: Paul H. Brookes Publishing.

Hay, J., Maclagan, M. & Gordon, E. (2008). *Dialects of English: New Zealand English.* Edinburgh: Edinburgh University Press.

Hindman, A. H., Wasik, B. A. & Snell, E. K. (2016). Closing the 30 million word gap: next steps in designing research to inform practice. *Child Development Perspectives* **10**, 134–9.

Hirsh-Pasek, K., Adamson, L. B., Bakeman, R., Owen, M. T., Golinkoff, R. M., Pace, A., . . . & Suma, K. (2015). The contribution of early communication quality to low-income children's language success. *Psychological Science* **26**, 1071–83.

Hoff, E., Core, C., Place, S., Rumiche, R., Señor, M. & Parra, M. (2012). Dual language exposure and early bilingual development. *Journal of Child Language* **39**, 1–27.

Horwitz, S. M., Irwin, J. R., Briggs-Gowan, M. J., Heenan, J. M. B., Mendoza, J. & Carter, A. S. (2003). Language delay in a community cohort of young children. *Journal of the American Academy of Child & Adolescent Psychiatry* **42**, 932–40.

Jackson-Maldonado, D., Marchman, V. A. & Fernald, L. C. (2013). Short-form versions of the Spanish MacArthur–Bates Communicative Development Inventories. *Applied Psycholinguistics* **34**, 837–68.

Jackson-Maldonado, D., Thal, D. J., Fenson, L., Marchman, V. A., Newton, T. & Conboy, B. (2003). *MacArthur Invenarios del Desarrollo de Habilidades Comunicativas.* User's Guide and Technical Manual. MacArthur Inventarios. Baltimore, MD: Brookes.

Kelly, B. F., Forshaw, W., Nordlinger, R. & Wigglesworth, G. (2015). Linguistic diversity in first language acquisition research: moving beyond the challenges. *First Language* **35**, 286–304.

362

Kelly, B. F., Kidd, E. & Wigglesworth, G. (2015). Indigenous children's language: acquisition, preservation and evolution of language in minority contexts. *First Language* **35**, 279–85.

Klee, T., Pearce, K. & Carson, D. K. (2000). Improving the positive predictive value of screening for developmental language disorder. *Journal of Speech, Language, and Hearing Research* **43**, 821–33.

Klee, T., Stokes, S. F., Reese, E., Jørgensen, R. N. & Bleses, D. (2012–2013). KidsWords: a nationwide study of New Zealand children's early language development. Online: <http://kidswords.org>.

Lieven, E. & Stoll, S. (2010). Language. In M. Bornstein (ed.), *The handbook of cultural developmental science*, 143–60. Mahwah, NJ: Lawrence Erlbaum.

Marchman, V. A., Martínez-Sussmann, C. & Dale, P. S. (2004). The language-specific nature of grammatical development: evidence from bilingual language learners. *Developmental Science* **7**, 212–24.

May, S. (1999). Language and education rights for Indigenous peoples. In S. May (ed.) *Indigenous community-based education* (pp. 42–66). Clevedon: Multilingual Matters.

McCarty, T. L. (2003). Revitalising indigenous languages in homogenizing times. *Comparative Education* **39**, 147–63.

Ministry of Education (2013). *Tau Mai Te Reo – The Māori language in education strategy 2013–2017*. Online: <https://education.govt.nz/ministry-of-education/overall-strategies-and-policies/tau-mai-te-reo-the-maori-language-in-education-strategy-2013-2017>.

Morton, S. M. B., Atatoa Carr, P. E., Bandara, D. K., Grant, C. C., Ivory, V. C., Kingi, T K. R., … & Waldie, K. E. (2010). *Growing up in New Zealand: a longitudinal study of New Zealand children and their families. Report 1: before we are born*. Auckland: Growing Up in New Zealand.

Morton, S. M., Grant, C. C., Carr, P. E. A., Robinson, E. M., Kinloch, J. M., Fleming, C. J., … & Liang, R. (2012). How do you recruit and retain a prebirth cohort? Lessons learnt from Growing Up in New Zealand. *Evaluation & the Health Professions*, **37**(4), 411–433.

Morton, S. M., Carr, P. E. A., Grant, C. C., Robinson, E. M., Bandara, D. K., Bird, A., … & Perese, L. M. (2013). Cohort profile: Growing up in New Zealand. *International Journal of Epidemiology* **42**, 65–75.

New Zealand Ministry of Education (2010). *High frequency word lists: 1000 frequent words in Māori*. Wellington: Ministry of Education.

New Zealand Ministry of Education (2014). *National Standards Results 2014: Reading, Maths, and Writing*. Wellington: Ministry of Education.

OECD (2014a). *Society at a glance 2014 highlights: New Zealand OECD social indicators*. Online: <https://www.oecd.org/newzealand/OECD-SocietyAtaGlance2014-Highlights-NewZealand.pdf>.

OECD (2014b). *Focus on inequality and growth: December 2014*. Online: <https://www.oecd.org/social/Focus-Inequality-and-Growth-2014.pdf>.

Pearson, B. Z. (2008). *Raising a bilingual child*. New York: Living Language.

Pearson, B. Z., Fernandez, S. C. & Oller, D. K. (1993). Lexical development in bilingual infants and toddlers: comparison to monolingual norms. *Language Learning* **43**, 93–120.

Peña, E. D. (2007). Lost in translation: methodological considerations in cross-cultural research. *Child Development* **78**, 1255–64.

Ratima, M. & May, S. (2011). A review of indigenous second language acquisition: factors leading to proficiency in Te reo Māori (the Māori language). *MAI Review*, 1, online: <http://review.mai.ac.nz>.

Rau, C. (2005). Literacy acquisition, assessment and achievement of Year Two students in total immersion in Māori programmes. *International Journal of Bilingual Education and Bilingualism* **8**, 404–32.

Reese, E., Ballard, E., Taumoepeau, M., Taumoefolau, M., Morton, S. B., Grant, C. & Perese, L. (2015). Estimating language skills in Samoan- and Tongan-speaking children growing up in New Zealand. *First Language* **35**, 407–27.

Reese, E. & Read, S. (2000). Predictive validity of the New Zealand MacArthur Communicative Development Inventory: words and sentences. *Journal of Child Language* **27**, 255–66.

Reilly, S., Bavin, E. L., Bretherton, L., Conway, L., Eadie, P., Cini, E., ... & Wake, M. (2009). The Early Language in Victoria Study (ELVS): a prospective, longitudinal study of communication skills and expressive vocabulary development at 8, 12 and 24 months. *International Journal of Speech-Language Pathology* **11**, 344–57.

Salmond, C. E., Crampton, P. & Atkinson, J. (2007). *NZDep2006 index of deprivation*. Wellington: University of Otago.

Schady, N., Behrman, J., Araujo, M. C., Azuero, R., Bernal, R., Bravo, D., ... & Vakis, R. (2015). Wealth gradients in early childhood cognitive development in five Latin American countries. *Journal of Human Resources* **50**, 446–63.

Statistics New Zealand (2005). *Understanding and working with ethnicity data*. Wellington: Statistics New Zealand.

Statistics New Zealand (2014). *Ka mārō te aho tapu, ka tau te korowai: te reo Māori findings from Te Kupenga 2013*. Online: <www.stats.govt.nz>.

Tangaere, A. R. & McNaughton, S. (2003). From preschool to home: processes of generalisation in language acquisition from an indigenous language recovery programme. *International Journal of Early Years Education* **2**, 23–40.

Timutimu, N., Ormsby-Teki, T. & Ellis, R. (2009). Reo o te Kāinga (Language of the Home): a Ngāi Te Rangi language regeneration project. In J. Reyhner & L. Lockard (eds), *Indigenous language revitalization: encouragement, guidance, and lessons learned*, 109–20. Flagstaff, AZ: Northern Arizona University.

364

APPENDIX A
Short Form of the NZ English CDI: II (NZE CDI:sf)

1 baa baa	34 broom	67 listen**
2 meow	35 comb	68 like**
3 ouch	36 mop	69 pretend
4 uh oh	37 plate	70 rip
5 woof woof	38 rubbish	71 shake
6 bear*	39 tray	72 taste
7 bird**	40 towel	73 gentle
8 cat*	41 bed*	74 think**
9 dog**	42 bedroom	75 wish*
10 duck	43 bench	76 all gone
11 horse**	44 oven	77 cold**
12 aeroplane	45 stairs	78 fast**
13 boat*	46 flag	79 happy*
14 car**	47 rain*	80 hot*
15 ball*	48 star*	81 last**
16 book**	49 swing	82 tiny*
17 game*	50 school**	83 wet
18 cracker	51 sky*	84 after**
19 fizzy drink	52 party*	85 day**
20 juice	53 friend**	86 tonight
21 lollies	54 mum**	87 our**
22 meat*	55 person*	88 them**
23 milk*	56 bye	89 this**
24 peas	57 hi	90 us**
25 tomato sauce	58 no**	91 where**
26 hat*	59 shopping	92 beside*
27 necklace	60 thank you	93 down**
28 shoe*	61 carry**	94 under**
29 sock	62 chase	95 all**
30 chin	63 dump	96 much**
31 ear*	64 finish*	97 could**
32 hand**	65 fit*	98 need**
33 leg*	66 hug	99 would**
		100 if**

NOTES: * on list of 1000 most frequent English words < http://www.k12reader.com/subject/vocabulary/fry-words/>
Fry High-Frequency Word Lists – Top 1000 words in spoken and written English for K-12th grade (24%).
** on list of 400 most frequent English words < http://www.k12reader.com/subject/vocabulary/fry-words/>
Fry High-Frequency Word Lists – Top 1000 words in spoken and written English for K-12th grade (32%).

365

APPENDIX B
Short Form of the NZ Māori CDI: II (NZM CDI:sf)

1 baa baa	34 puruma	67 whakarongo**
2 me ow	35 heru	68 pai**
3 mamae*	36 mapu	69 takune
4 uh oh	37 pereti	70 tihae
5 woof woof	38 rapahi	71 ueue
6 pea**	39 pereti	72 hā*
7 manu**	40 tauera	73 hūmarie
8 ngeru*	41 moenga*	74 whakaaro**
9 kurī**	42 rūma moenga	75 hiahia**
10 rakiraki	43 tēpu*	76 kua pau
11 hoiho*	44 umu	77 makariri*
12 waka rererangi	45 arawhata	78 tere**
13 pōti*	46 haki*	79 koa*
14 waka**	47 ua*	80 wera**
15 pōro*	48 whetū**	81 whakamutunga*
16 pukapuka**	49 tāwēwē	82 iti**
17 kemu**	50 kura**	83 mākū**
18 pihikete	51 rangi**	84 muri**
19 inu reka	52 pāti	85 rā**
20 wai arani	53 hoa**	86 pō**
21 rare	54 māmā**	87 (ō) mātou**
22 mīti*	55 tangata**	88 rātou**
23 miraka*	56 ka kite	89 tēnei**
24 pī*	57 kia ora	90 mātou**
25 wairanu tomato	58 kāo*	91 (kei) hea**
26 pōtae*	59 hokohoko*	92 i te taha
27 tāhei	60 kia ora	93 raro**
28 hū**	61 hari*	94 raro**
29 tōkena*	62 whai**	95 katoa**
30 kauwae	63 putunga	96 nui**
31 taringa*	64 mutu**	97 taea**
32 ringaringa*	65 uru pai	98 hiahia**
33 waewae**	66 awhiawhi*	99 āhei*
		100 mehemea**

NOTES: * on list of 1000 most frequent Māori words, New Zealand Ministry of Education, 2010 (25%).
** on list of 360 most frequent Māori words, New Zealand Ministry of Education, 2010 (39%).

APPENDIX C

Parental Concern Question

Parents may have a range of concerns about their children's speech or hearing, such as those listed on this showcard. Do you feel that [child's name] has any of these issues?

1. no concerns
2. reluctant to speak
3. speech not clear to family
4. speech not clear to others
5. difficulty finding words
6. difficulty putting words together
7. doesn't understand you when you speak
8. doesn't understand others when they speak
9. voice sounds unusual
10. stutters, stammers, or lisps
11. other