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*Research Article*

# Early Vocabulary Development of Australian Indigenous Children: Identifying Strengths

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The current study sought to increase our understanding of the factors involved in the early vocabulary development of Australian Indigenous children. Data from the Longitudinal Study of Indigenous Children were available for 573 Indigenous children (291 boys) who spoke English ($M$ = 37.0 months, $SD$ = 5.4 months, at wave 3). Data were also available for 86 children (51 boys) who spoke an Indigenous language ($M$ = 37.1 months, $SD$ = 6.0 months, at wave 3). As hypothesised, higher levels of parent-child book reading and having more children's books in the home were associated with better English vocabulary development. Oral storytelling in Indigenous language was a significant predictor of the size of children's Indigenous vocabulary.

## 1. Introduction

Despite the years of concerted effort by governments, non-government organisations, community members, and parents, educational outcomes for Indigenous children (Aboriginal and Torres Strait Islander) in Australia remain well below those of non-Indigenous children [1]. In the scientific literature there is increasing recognition of the importance of early childhood development for addressing the intergenerational transmission of disadvantage [2, 3]. Indeed national surveys have found that Australian Indigenous children are more than twice as likely to be developmentally vulnerable than non-Indigenous children at the beginning of formal schooling [4, 5]. The literature indicates that these differences at the beginning of children's formal schooling have significant implications for their subsequent educational outcomes[6].

Language acquisition is an integral component of "school readiness" [7, 8] yet surprisingly little is known about the early language development of Australian Indigenous children. Thus, conducting research designed specifically to increase our understanding of the early language development of these children offers one of the most promising ways to address the disadvantage that they face. The purpose of the current study was to investigate the factors involved in the early vocabulary development of Australian Indigenous children.

The findings of two major reviews of the evidence (meta-analyses) support the importance of parent-child book reading as a means of promoting the vocabulary development of children in Western societies [9, 10]. Research has also found that having more children's books in the home is associated with better child vocabulary development [11]. However, we are unaware of any research that has directly assessed whether parent-child book reading and having more children's books in the home are associated with better English vocabulary development for Australian Indigenous children, nor are we aware of any research that has tested whether Australian Indigenous children who read books in Indigenous language have better Indigenous vocabulary development.

It is also important that researchers recognise that failing to understand differences in culture and values can jeopardise the ethics and quality of their research, cause harm, and undermine trust [12, 13]. Research that identifies both the similarities and the differences across cultures can provide incredibly important information to service providers who work in the area of early childhood development. It can also provide decolonising support to Aboriginal and Torres Strait Islander families and communities as they pursue the goal of growing their children up strong.

There is a growing awareness of the need to recognise the importance of the oral storytelling tradition as a culturally

appropriate foundation for language and literacy development [14]. The oral nature of Australian Indigenous culture has implications for the early vocabulary development of Australian Indigenous children. However, we are unaware of any research that has investigated whether Australian Indigenous children who are told oral stories in Indigenous language have larger Indigenous language vocabularies.

The aim of the current study was to help fill these gaps in our understanding. It was hypothesised that (1) parent-child book reading in English would be associated with better English vocabulary development, (2) having more children's books in the home would be associated with better English vocabulary development, (3) Indigenous children who are read books in Indigenous language would have larger Indigenous language vocabularies, and (4) children who are told more oral stories in Indigenous language would have larger Indigenous language vocabularies.

## 2. Method

*2.1. Participants.* Footprints in Time: the Longitudinal Study of Indigenous Children (LSIC) is the first large-scale longitudinal survey to focus on the development of Australian Indigenous children [15]. The first wave of the survey was conducted in 2008 and 2009, with subsequent waves conducted annually. Further details regarding the rationale, sampling, recruitment, and data collection have been reported by Bennetts-Kneebone et al. [16].

The analyses for the current paper are based on waves 1, 2, and 3 data from the Baby cohort of children who were aged 2 years or less at wave 1 ($M$ age = 15.1 months, $SD$ = 4.5 months) and had a median age of 37 months ($M$ age = 37.1 months, $SD$ = 5.4 months) at wave 3. A total of 909 children (465 boys) were recruited for wave 1, and these children were involved in subsequent waves where possible. Eighty six percent of the children participated in wave 2 and 89% in wave 3. The majority (87.8%) of the children were identified by the parent as Aboriginal with 5.7% Torres Strait Islander and 6.5% identified as being both. At wave 1, 94.9% of the children spoke English, 20.0% spoke an Indigenous language, and 15.0% spoke both English and an Indigenous languages. The primary respondent at each wave was the child's primary parent or carer [16]. The parent who completed the wave 1 interview was the birth mother in 93.9% of the cases and the data reported here relate to responses from the person identified as the primary parent.

*2.2. Measures*

*2.2.1. Child Vocabulary.* Child expressive vocabulary was measured at wave 3 using the MacArthur Communicative Development Inventory III (MCDI-III) [17]. The MCDI-III asks parents to check words their child says on a checklist and provides a valid measure of expressive vocabulary [17]. For the Australian version used in the LSIC the words reindeer, cracker, and sidewalk were replaced with the words kangaroo, biscuit, and footpath resulting in a 100-word checklist. Parents were asked to indicate whether or not their child said each word in English and/or in an Indigenous language.

*2.2.2. Parent-Child Book Reading.* Parent-child book reading was assessed during the parent interviews at waves 1, 2, and 3. Parents answered a single item at each wave ("Did you or (STUDY CHILD)'s other family members read a book to (him/her) last week?"). Because of the impracticality of collecting relevant observational data, parent report measures of parent-child book reading frequency are common [18, 19] and parental reports of other types of parent-child interaction have been found to have good agreement with observational measures [20]. At wave 1 the child's mother was recorded as one of the people who had read to the child in the last week in 82.3% of the cases and the child's father in 29.7% (other relatives less than 23.4%). Hence, in the majority of cases it was one of the parents (the child's mother in particular) who had read to the child. Parents were also asked whether or not the child had been read books in an Indigenous language. For the present study responses to each question were summed across the three waves to provide two total scores which ranged from 0 (no parent-child book reading at any wave) to 3 (parent-child book reading recorded at all 3 waves) representing the amount of parent-child book reading in English and in an Indigenous language.

*2.2.3. Number of Children's Books in the Home.* The number of children's books in the home was measured at waves 1 and 2 using a single item ("About how many children's books does the child have in your home now, including any library books?"). At wave 1 mothers responded on a 6-point scale which ranged from none to more than 30. At wave 2 mothers responded on an 8-point scale which ranged from none to more than 100. Scores for wave 2 were converted to the same scale as wave 1 and then an average of the two waves was created to represent the number of children's books in the home across the waves.

*2.2.4. Oral Storytelling in Indigenous Language.* During the interviews at waves 1, 2, and 3 parents were asked whether in the last week they or other family members had told the child a story (not from a book) in Indigenous language. For the present study responses were summed across the three waves to provide a total score which ranged from 0 (no oral storytelling in Indigenous language at any wave) to 3 (oral storytelling in Indigenous language recorded at all 3 waves).

*2.2.5. Covariates.* A number of variables that may influence language development were included as covariates. These were child gender, age, and ear/hearing problems; primary carer age, education, and language; family income; number of children in the home; and level of relative geographic isolation. At the first wave parents were asked whether the child had ever had ear and/or hearing problems and this was followed up at subsequent waves. For the present analyses a summary variable was created which indicated whether ear and/or hearing problems had ever been reported. The number of children in the home was calculated at each

Table 1: Included versus excluded children for English vocabulary analyses.

| Variable | Excluded | | Included | |
|---|---|---|---|---|
| | *M* | *SD* | *M* | *SD* |
| Level of relative isolation (4-point scale) | 2.24 | .94 | 2.02 | .92 |
| Family income (7-point scale) | 4.14 | 1.72 | 4.30 | 1.73 |
| Number of children in home | 2.9 | 1.8 | 3.3 | 1.7 |
| Primary carer education (max. score 14) | 6.35 | 3.15 | 5.67 | 2.86 |
| Primary carer age (years) | 28.1 | 7.1 | 28.3 | 7.1 |

$N = 336$ for excluded, 573 for included.

wave. The highest number recorded was used in the present analyses. Primary carer education was reported at waves 2 and 3 on a fourteen-point scale that ranged from never attended school to postgraduate degree. In the present study the most recently reported value was used. At the first wave the primary carer was asked whether or not they spoke English and/or an Indigenous language. This was followed up at subsequent waves where there was a change in the primary carer. Family income was reported at waves 1 and 2 on a seven-point scale that ranged from less than $150/week to $1,000 or more per week. The most recently reported value was used in the current study. The level of relative geographic isolation of the household was recorded at each wave on a four-point scale that ranged from none to high/extreme. The highest value recorded was used in the present analyses.

## 3. Results

*3.1. Predicting Children's Wave 3 English Vocabulary.* Complete sets of the relevant data were available for 573 children (291 boys) who had a median age of 15 months ($M$ age = 15.0 months, $SD$ = 4.5 months) at wave 1. There was mixed evidence that the group of children for whom complete data were not available (excluded children) differed from the children for whom complete data were available (included children) in terms of disadvantage. As can be seen in Table 1, maternal age and family income did not differ significantly between the groups (both $t$s $< 1.28$, both $P$s $> .20$). The excluded children were from households where the relative geographic isolation was significantly greater but their mothers were significantly more educated and they had significantly less children in the home (all $t$s $> 2.84$, all $P$s $< .006$).

Descriptive statistics for the included children are presented in Table 2. Inspection of the correlations between the measures revealed that the degree of multicollinearity between the predictor variables was acceptable (see Table 3). As hypothesized, significant positive correlations were observed between children's English vocabulary at wave 3 and both parent-child book reading and the number of children's books in the home (see Table 3).

In the first hierarchical regression predicting children's English vocabulary at wave 3, after controlling for the covariates at the first step, as hypothesized, parent-child book reading was a significant predictor at the second step (see Regression 1, Table 4). Similarly, as predicted, in the second hierarchical regression predicting children's English vocabulary, after controlling for the covariates at the first step, the number of children's books in the home was a significant predictor at the second step (see Regression 2, Table 4).

Table 2: Descriptive statistics for English vocabulary analyses.

| Variable | *M* | *SD* |
|---|---|---|
| W3 child English vocabulary (max. score 100) | 61.55 | 31.02 |
| Parent-child book reading (max. score 3) | 2.33 | .91 |
| Number of children's books (6-point scale) | 4.16 | 1.64 |
| Child ear/hearing problem | 34.7% | |
| W3 child age (months) | 37.0 | 5.4 |
| Primary carer age (years) | 28.3 | 7.1 |
| Primary carer education (max. score 14) | 5.67 | 2.86 |
| Primary carer speaks English | 97.0% | |
| Number of children in home | 3.3 | 1.7 |
| Family income (7-point scale) | 4.30 | 1.73 |
| Level of relative isolation (4-point scale) | 2.02 | .92 |

$N = 573$.

*3.2. Predicting Children's Wave 3 Indigenous Vocabulary.* Complete sets of the relevant data were available for 86 children (51 boys) who spoke an Indigenous language. Nearly all of these children (96%) were bilingual with English as their first language. They had a median age of 15 months ($M$ age = 14.8 months, $SD$ = 4.5 months) at wave 1. Descriptive statistics are presented in Table 5. Inspection of the correlations between the measures revealed that the degree of multicollinearity between the predictor variables was acceptable (see Table 6). As hypothesized, significant positive correlations were observed between children's Indigenous vocabulary and both parent-child book reading and oral storytelling (see Table 6).

In the first hierarchical regression predicting children's Indigenous vocabulary, after controlling for the covariates at the first step, parent-child book reading was not significant ($P = .06$) as a predictor at the second step (see Regression 1, Table 7). In the second hierarchical regression predicting children's Indigenous vocabulary as hypothesized, after controlling for the covariates at the first step, the amount of oral storytelling was a significant predictor at the second step (see Regression 2, Table 7).

## 4. Discussion

The purpose of the current study was to investigate the factors involved in the early vocabulary development of Australian Indigenous children. It was hypothesised that (1) parent-child book reading in English would be associated with better English vocabulary development, (2) having more children's books in the home would be associated with better English vocabulary development, (3) Indigenous children who are read books in Indigenous language would have larger Indigenous language vocabularies, and (4) Indigenous children who are told more oral stories in Indigenous language would

Table 3: Intercorrelations between variables for English vocabulary analyses.

| Variable | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| (1) W3 child English vocabulary | — | | | | | | | | | | | |
| (2) Parent-child book reading | .26$^{\dagger}$ | — | | | | | | | | | | |
| (3) Number of children's books | .29$^{\dagger}$ | .54$^{\dagger}$ | — | | | | | | | | | |
| (4) Child gender | .09$^{*}$ | .05 | .04 | — | | | | | | | | |
| (5) Child ear/hearing problem | −.05 | .08$^{*}$ | .07 | −.03 | — | | | | | | | |
| (6) W3 child age | .26$^{\dagger}$ | .00 | −.07 | .02 | .08$^{*}$ | — | | | | | | |
| (7) Primary carer age | .01 | .11$^{*}$ | .22$^{\dagger}$ | .02 | .02 | .03 | — | | | | | |
| (8) Primary carer education | .12$^{*}$ | .20$^{\dagger}$ | .29$^{\dagger}$ | .01 | .09$^{*}$ | .01 | .21$^{\dagger}$ | — | | | | |
| (9) Primary carer speaks English | .16$^{\dagger}$ | .04 | .11$^{*}$ | −.01 | .02 | .03 | −.01 | −.03 | — | | | |
| (10) Number of children in home | −.04 | −.06 | −.08 | −.03 | .00 | .04 | .20$^{\dagger}$ | −.13$^{*}$ | .01 | — | | |
| (11) Family income | .21$^{\dagger}$ | .34$^{\dagger}$ | .50$^{\dagger}$ | −.02 | .09$^{*}$ | −.07 | .20$^{\dagger}$ | .36$^{\dagger}$ | .08$^{*}$ | −.03 | — | |
| (12) Level of relative isolation | −.27$^{\dagger}$ | −.33$^{\dagger}$ | −.56$^{\dagger}$ | −.06 | .01 | .13$^{*}$ | −.10$^{*}$ | −.15$^{\dagger}$ | −.32$^{\dagger}$ | .11$^{*}$ | −.33$^{\dagger}$ | — |

$^{*}P < .05$, $^{\dagger}P < .001$, $N = 573$.

Table 4: Summary of hierarchical regression analyses for variables predicting English vocabulary.

| Variable | $b$ | SE ($b$) | $\beta$ | $P$ | Squared part correlation | $\Delta R^2$ |
|---|---|---|---|---|---|---|
| Step 1 | | | | | | .21$^{*}$ |
| Child gender | 4.64 | 2.34 | .08 | .05 | .01 | |
| Child ear/hearing problem | −5.73 | 2.48 | −.09 | .02 | .01 | |
| W3 Child age | 1.81 | .22 | .31 | <.01 | .09 | |
| Primary carer age | −.25 | .17 | −.06 | .15 | .00 | |
| Primary carer education | .49 | .45 | .05 | .28 | .00 | |
| Primary carer speaks English | 12.41 | 7.32 | .07 | .09 | .00 | |
| Number of children in home | −.08 | .71 | −.00 | .92 | .00 | |
| Family income | 2.85 | .77 | .16 | <.01 | .02 | |
| Level of relative isolation | −7.85 | 1.46 | −.23 | <.01 | .04 | |
| Regression 1 | | | | | | |
| Step 2 | | | | | | .02$^{*}$ |
| Parent-child book reading | 5.52 | 1.41 | .16 | <.01 | .02 | |
| Regression 2 | | | | | | |
| Step 2 | | | | | | .02$^{*}$ |
| Number of children's books | 3.40 | .95 | .18 | <.01 | .02 | |

$^{*}P < .05$, $N = 573$.

Table 5: Descriptive statistics for Indigenous vocabulary analyses.

| Variable | $M$ | $SD$ |
|---|---|---|
| W3 child Indigenous vocabulary (max. score 100) | 12.00 | 16.93 |
| Parent-child book reading (max. score 3) | .36 | .51 |
| Oral storytelling (max. score 3) | .62 | .65 |
| Child ear/hearing problem | 36.0% | |
| W3 Child age (months) | 37.1 | 6.0 |
| Primary carer age (years) | 27.5 | 7.0 |
| Primary carer education (max. score 14) | 5.34 | 2.52 |
| Primary carer speaks Indigenous language | 8.2% | |
| Number of children in home | 4.0 | 2.1 |
| Family income (7-point scale) | 3.40 | 1.69 |
| Level of relative isolation (4-point scale) | 2.99 | .99 |

$N = 86$.

have larger Indigenous language vocabularies. The findings relevant to these hypotheses are discussed in the following sections.

*4.1. Parent-Child Book Reading, Number of Children's Books in the Home, and Children's English Vocabulary Development.* As predicted both parent-child book reading and the number of children's books in the home significantly predicted Indigenous children's English vocabulary development. To our knowledge this is the first study to directly test these hypotheses. The current results are consistent with the findings of two meta-analyses that support the importance of parent-child book reading as a means of promoting the vocabulary development of children in Western societies [9, 10] as well as research which has found that having more children's books in the home is associated with better child vocabulary development [11]. However, the amount of variance in children's English vocabulary development explained by differences in parent-child book reading in the current study is less than that found in studies of non-Aboriginal Australian children [21]. Possible explanations for this and the limitations of the current study are discussed below.

Table 6: Intercorrelations between variables for Indigenous vocabulary analyses.

| Variable | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| (1) W3 child Indigenous vocabulary | — | | | | | | | | | | | |
| (2) Parent-child book reading | .22* | — | | | | | | | | | | |
| (3) Oral storytelling | .28* | .46† | — | | | | | | | | | |
| (4) Child Gender | −.03 | −.03 | .02 | — | | | | | | | | |
| (5) Child ear/hearing problem | −.05 | −.01 | .11 | .02 | — | | | | | | | |
| (6) W3 Child age | −.03 | −.15 | .08 | −.03 | .25* | — | | | | | | |
| (7) Primary carer age | −.16 | .05 | −.09 | .11 | .00 | .11 | — | | | | | |
| (8) Primary carer education | −.05 | .04 | −.08 | −.05 | .07 | −.04 | .22* | — | | | | |
| (9) Primary carer speaks Indigenous | .32* | .12 | .20 | −.01 | .13 | −.01 | −.24* | .03 | — | | | |
| (10) Number of children in home | −.03 | .05 | .15 | .01 | .11 | .07 | .29* | −.20 | .02 | — | | |
| (11) Family income | −.04 | −.02 | −.06 | −.01 | −.06 | −.04 | .10 | .35* | −.13 | .04 | — | |
| (12) Level of relative isolation | .29* | −.04 | .08 | −.06 | .18 | .28* | −.06 | .06 | .41† | −.10 | .00 | — |

*$P < .05$, †$P < .001$, $N = 86$.

Table 7: Summary of hierarchical regression analyses for variables predicting Indigenous vocabulary.

| Variable | $b$ | SE ($b$) | $\beta$ | $P$ | Squared part correlation | $\Delta R^2$ |
|---|---|---|---|---|---|---|
| Step 1 | | | | | | .16 |
| Child gender | −.28 | 3.65 | −.01 | .94 | .00 | |
| Child ear/hearing problem | −3.76 | 3.93 | −.11 | .34 | .01 | |
| W3 Child age | −.17 | .33 | −.06 | .60 | .00 | |
| Primary carer age | −.21 | .30 | −.09 | .49 | .01 | |
| Primary carer education | −.30 | .83 | −.05 | .72 | .00 | |
| Primary carer speaks Indigenous | 9.35 | 5.22 | .22 | .08 | .04 | |
| Number of children in home | .16 | .98 | .02 | .87 | .00 | |
| Family income | .07 | 1.16 | .01 | .95 | .00 | |
| Level of relative isolation | 3.95 | 2.12 | .23 | .07 | .04 | |
| Regression 1 | | | | | | |
| Step 2 | | | | | | .04[a] |
| Parent-child book reading | 6.81 | 3.55 | .20 | .06 | .04 | |
| Regression 2 | | | | | | |
| Step 2 | | | | | | .05* |
| Oral storytelling | 6.29 | 2.77 | .24 | .03 | .05 | |

*$P < .05$, [a]$P = .06$, $N = 86$.

*4.2. Oral Storytelling, Parent-Child Book Reading, and Children's Indigenous Vocabulary Development.* As hypothesised Indigenous children who were told more oral stories in Indigenous language had larger Indigenous vocabularies. However, the amount of parent-child book reading in Indigenous language failed to reach significance ($P = .06$) as a predictor of children's Indigenous language development. Possible reasons for this are discussed below.

The current findings add to the literature from Indigenous nations in Canada highlighting the importance of the oral storytelling tradition as a culturally appropriate foundation for language and literacy development [14]. Indeed, to our knowledge this is the first study to show that Australian Indigenous children who are told more stories in Indigenous language have better Indigenous language development. This finding has important implications for policy and practice. After reviewing the available literature Hoff [22] recently argued that, given the obvious cultural, social, and economic benefits of bilingualism and the fact that many bilingual children begin school with levels of English proficiency that are an obstacle to academic achievement in standard educational programs, it is important that curricula and teaching practices are improved to meet the needs of children from culturally and linguistically diverse backgrounds. Furthermore, the findings of earlier research (e.g., [23–25]) and more recent Australian [26, 27] and international [28–30] reviews identify many benefits that well-designed bilingual instruction can deliver and, conversely, the many downsides associated with English only education policies. Indeed it has been argued that there has been too much focus on "deficits" and a failure to see children's ability to speak an Indigenous language as a strength rather than a deficit [31].

*4.3. Limitations and Directions for Future Research.* The fact that the amount of variance in children's English vocabulary development explained by differences in parent-child book

reading in the current study is less than that found in studies of non-Indigenous Australian children may be explained by differences in the sensitivity of the measures used. Research that has found larger effect sizes has assessed the amount of time the child is read to on a daily basis [11, 21]. Further, the measure of parent-child book reading in the current study is only a proxy measure of a child's level of exposure to this activity and, accordingly, it is not possible to draw strong conclusions about the size of the effect on children's vocabulary development. This may also help explain why the amount of parent-child book reading in Indigenous language failed to significantly predict children's Indigenous language development. Indeed, even though it failed to reach significance, the effect size observed for parent-child book reading in Indigenous language was larger than that for parent-child book reading in English. Another possible explanation is that the Indigenous language vocabulary measure used in the current study was not culturally appropriate enough in terms of the words assessed and/or sensitive enough as a measure of Indigenous vocabulary development (which for the majority of children was not their first language).

Another possible limitation of the current study is the use of maternal report measures of parent-child book reading and oral storytelling. Although social desirability cannot explain the pattern of results found in the present study, it could be the case that it biases the reports in favour of higher levels of parent-child book reading and oral storytelling. Future research using observational measures and/or a multimethod multiinformant approach would help confirm the current findings. Other directions for future research include assessment of whether interventions that provide children's books and instruction which increase the frequency and quality of parent-child book reading improve Indigenous children's English and/or Indigenous vocabulary development. Similarly, research could investigate whether Indigenous children with language delays benefit from programs that instruct parents and/or teachers in adult-child book reading.

## 5. Conclusions

Keeping the limitations of the measures used in mind, the findings of the present study are the first to show that both parent-child book reading and the number of children's books in the home significantly predict the English vocabulary development of Australian Indigenous children and that children who are told more oral stories in Indigenous language have larger Indigenous language vocabularies. This suggests that, just like other English speaking children [32–34], Australian Indigenous children are likely to benefit from interventions that provide children's books and instruction which increases the frequency and quality of parent-child book reading and that children with language delays are likely to benefit from programs that instruct parents and/or teachers in adult-child book reading. Future research should investigate these possibilities. The current findings also highlight the importance of recognising the role of oral storytelling in Indigenous children's language development.

## Conflict of Interests

The authors declare that there is no conflict of interests regarding the publication of this paper.

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