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Running Head: HOME PRACTICES AND LITERACY DEVELOPMENT

Pre-school home literacy practices and children's literacy development: A longitudinal
analysis

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Abstract

This 3-year longitudinal study tested and extended Sénéchal and Le Fevre's (2002) model of the relationships between pre-school home literacy practices and children's literacy and language development. Parent-child reading (home literacy environment questionnaire plus children's Title Recognition Test) and parental teaching of letters, words and name writing were assessed 6 months prior to children's school entry. The 143 children (55% males; mean age 5.36 years, $SD = 0.29$) attended Gold Coast, Australia government Preschools. Parent-child reading and literacy teaching were only weakly correlated ($r = .18$), and were related to different outcomes consistent with the original model. Age, gender, memory, and non-verbal ability were controlled. Parental teaching was independently related to Preschool Woodcock Letter-Word Identification scores ($R^2_{\text{change}} = 4.58\%$, $p = .008$). This relationship then mediated the relationships between parental teaching and Grade 1 and 2 letter-word identification, single-word reading and spelling rates, and phonological awareness (rhyme detection and phonological deletion). Parent-child reading was independently related to Grade 1 vocabulary ($R^2_{\text{change}} = 5.6\%$, $p = .005$). Thus, both home practices are relevant, but to different aspects of literacy and language development.

KEY WORDS: Early home literacy environment, Print Exposure, Reading Development, Phonological Processing, Literacy Development, Parent-child reading

Pre-School Home Literacy Practices and Children's Literacy Development: A Longitudinal
Analysis

The secret of it all lies in the parents reading to and with the child

Huey, 1908, p. 32.

Parents are encouraged to read to their children from an early age to prepare them for literacy acquisition after school entry. The US Commission on Reading argued that reading to children is “the single most important activity in building the knowledge required for eventual success in reading” (Anderson, Hiebert, Wilkinson, & Scott, 1985, p.23). Thus, the mechanism by which parent-child reading aids the child's reading acquisition is of interest. Reading acquisition is known to be fostered by several pre-literacy skills that emerge in the pre-school years (e.g., Adams, 1990). These are oral language skills (phonological awareness and vocabulary) and written language skills (especially letter knowledge).

Parent-child reading fosters these pre-literacy skills, which provide a mechanism to explain the relationship between parent-child reading and children's own reading. In their meta-analysis, Bus, van IJzendoorn, and Pellegrini (1995) reported moderate effect sizes for the relationships between the frequency of parent-child reading and language skills ($d = 0.67$), emergent literacy (letter knowledge and phonological processing $d = 0.58$), and reading achievement ($d = 0.55$). Overall, parent-child reading explained around 8% of the variance in early reading skill (Scarborough & Dobrich, 1994). The effects were larger in younger samples, suggesting the relationship is stronger around the emergence of reading. Bus et al. also found that the effects of parent-child reading did not differ by socioeconomic status (SES). Even in families with low SES and low literacy level and with few other incentives to become literate, engagement in shared reading had a positive impact on children's language and literacy outcomes.

Sénéchal, Le Fevre, and colleagues examined the association between more formal literacy teaching practices (e.g., direct teaching of letter names and sounds) and these pre-literacy skills and subsequent reading (Sénéchal & Le Fevre, 2002; Sénéchal, Le Fevre, Thomas, & Daley, 1998). Sénéchal et al. found that informal reading and formal teaching were independent factors in the early home environment. Further, formal teaching was more relevant in children's reading acquisition than informal parent-child reading (Sénéchal & Le Fevre; Sénéchal et al.), yet far fewer parents engage in teaching than in storybook reading with pre-school children (Wood, 2002).

Sénéchal and Le Fevre (2002) proposed a causal model of the relationships between pre-school parent-child reading and teaching practices, the pre-literacy factors related to early reading, and subsequent reading development over the first three years of school. The model was based on a theoretical view of learning to read that emphasized the facilitating roles of phonological awareness and letter knowledge in word identification, and of language skills in comprehension processes in reading (e.g., Adams, 1990). Sénéchal and Le Fevre proposed a direct path from frequency of parent-child book reading to receptive language (receptive vocabulary and listening comprehension) skills at the start of first grade, which in turn predicted reading (word reading and passage comprehension) at the end of third grade. In contrast, there was a direct path from the frequency of parental literacy teaching to emergent literacy skills (CVC word decoding, invented spelling, and letter name knowledge) at the start of first grade, which, in turn, was related to reading at the end of first grade. Sénéchal and Le Fevre found no evidence for direct paths from either parental practice to phonological awareness at the start of first grade. Thus, there were distinct pathways from each pre-school home literacy practice to different underlying causal components of reading. Parent teaching was relevant in fostering early word identification,

whereas parent-child reading was initially relevant in fostering language development. However, by the third grade, once reading involved both word decoding and reading comprehension, these distinct language and emergent literacy paths were both relevant in mature reading.

The current study tested and extended Sénéchal and Le Fevre's (2002) model of the direct and mediated paths between early home literacy practices, children's emergent literacy skills, and subsequent literacy and language skills in a 3-year longitudinal study (Preschool to Grade 2), using a different cultural and SES sample (an Australian low to middle class sample). We focused on predictors of single word identification (Woodcock letter-word identification accuracy and a 1-minute timed measure of single word identification rate) rather than comprehension due to the younger age of our sample at the final phase. We also extended the model by examining predictors of spelling development. Both home literacy questionnaire items plus a children's Title Recognition Test were used to assess the early home literacy environment. This was intended to capture a wider range of potentially important aspects of the home environment.

Bus et al. (1995) reported that relationships between pre-literacy and reading outcome measures did not differ depending on whether the home literacy environment was measured using a single question (e.g., the frequency of book reading) or a composite of questionnaire items (e.g., the frequency of book reading, the number of children's books owned, and the frequency of library visits). Sénéchal et al. (1998) argued against the use of questionnaire items on the basis of difficulty estimating the frequency of literacy activities, strong social desirability, and their failure to meet adequate psychometric criteria. Title Recognition (TRT) and Author Recognition (ART) Tests are considered more objective measures of parent-child reading that overcome some of these methodological flaws. However,

Sénéchal, LeFevre, Hudson, and Lawson (1996) found questionnaire items and TRT and ART scores were significantly related, suggesting that they both assess the construct of home literacy environment. Title and Author Recognition Tests consist of real book titles (TRT) and author's names (ART), as well as foils (made-up titles or names). The scoring is based on signal detection theory. The number of foils "recognized" measures response bias, which is used to correct the number of real items recognized. Olson, Wise, Johnson, and Ring (1997) argued that ART and TRT have high error variance due to guessing and the ability to "recognize" a title or author that has not actually been read. However, Echols, West, Stanovich, and Zehr (1996) argued that many activities that result in recognizing titles or authors that have not been read are themselves indicative of a literate environment (e.g., seeing them in bookstores, libraries, or newspapers).

Parent-Child Reading and Children's Literacy Development

Greater parent-child reading is consistently associated with more advanced language skills. Between 6.4% and 13% of the variance in language (generally measured as receptive vocabulary) was explained by parent-child reading, measured either as the age reading first began (Burgess, Hecht, & Lonigan, 2002), a TRT/ART composite (Sénéchal & LeFevre, 2002; Sénéchal et al., 1998), or a composite of home literacy questionnaire items and TRT (Fritjers et al., 2000), with the latter composite accounting for the most variance. These relationships were independent of age, earlier oral skill, phonological awareness, letter knowledge, parental education and personal reading habits, and literacy teaching practices. Meyer, Wardrop, Stahl, and Linn (1994) reported a similar positive relationship between the frequency of kindergarten teachers' reading to children and the children's language. Only Evans, Shaw, and Bell (2000) failed to find a significant relationship.

In contrast, most studies failed to find significant relationships between parent-child reading and children's letter knowledge (Evans et al., 2000; Sénéchal & Le Fevre, 2002; Sénéchal et al., 1998) or phonological awareness (Baker, Fernandez-Fein, Scher, & Williams, 1998; Cunningham & Stanovich, 1993; Evans et al.; Foy & Mann, 2003; Sénéchal & Le Fevre; Sénéchal et al.), that were independent of age, IQ, oral language, and parental print exposure and education. Significant relationships were found in a couple of studies (Burgess et al., 2002; Fritjers et al., 2000); however, Fritjers et al. found that phonological awareness perfectly mediated the relationship between parent-child reading and children's letter knowledge.

Studies examining the relationship of parent-child reading and the child's own subsequent reading produced similarly mixed results. The amount of parent-child reading did not differentiate precocious early readers from non-readers (Stainthorp & Hughes, 2000) or good first grade readers from poor readers (Elbro, Borsrtrøm, & Petersen, 1998). Estimates of the variance explained in children's Grade 1 word reading by parent-child reading vary from non-significant (Sénéchal & Le Fevre, 2002) through 3.2% (Burgess et al., 2002) to 34.9% (Cunningham & Stanovich, 1993). One explanation as to why Cunningham and Stanovich found that parent-child reading (TRT scores) explained such a large percentage of the variance in Grade 1 reading is that they had a small sample ($N = 26$), which might not have been representative of the general beginner reader population.

Although Sénéchal and Le Fevre (2002) did not find that parent-child reading (TRT/ART scores) predicted Grade 1 reading, they did find it predicted Grade 3 reading. However, this relationship was perfectly explained by shared variance with Grade 1 receptive language. Thus, the effect of earlier parent-child reading on later reading was indirect.

Cunningham and Stanovich (1993) also examined the relationship between parent-child reading and spelling. They found that TRT scores explained 20% to 40% of the variance in spelling, after partialling out variance due to phonological processing. However, Evans et al. (2000) found that both phonological processing and earlier letter knowledge accounted for significant variance in Grade 1 and 2 spelling. Thus, it is possible that earlier letter knowledge mediates any relationship between parent-child reading and children's spelling that is not accounted for by phonological processing.

Parent Literacy Teaching and Children's Literacy Development

Although limited, the research examining the role of more formal parent teaching practices consistently shows that engaging pre-school children in more formal letter-based activities is predictive of children's own emerging literacy skills. Children who were precocious early readers or who had significantly better letter knowledge and emergent word identification skills than their peers had parents who taught them letters and writing skills (Durkin, 1966; Haney & Hill, 2004; Jackson, Donaldson, & Cleland, 1988). Parental teaching accounted for up to 10% of the variance in children's letter knowledge, after controlling for age, cognitive ability, phonological awareness, parent education, and storybook reading (Evans et al., 2000; Sénéchal & Le Fevre, 2002). According to Sénéchal and Le Fevre's model, the relationship between pre-school parent teaching and children's later reading is mediated by this earlier relationship with emergent literacy skills.

Previous studies found mixed results regarding the relationship between parent teaching and language skills. Parent teaching was not directly related to phonological awareness, after controlling for letter knowledge and vocabulary (Foy & Mann, 2003; Sénéchal & Le Fevre, 2002). Haney and Hill (2004) found a trend toward children whose parents taught literacy skills having more advanced vocabulary (composite of receptive and

expressive) than those whose parents did not ($p = .07$). When they examined specific teaching practices, they found that teaching letter sounds was related to significantly more advanced vocabulary. However, Sénéchal & Le Fevre (2002) found that teaching did not account for unique variance in receptive language, after variance due to grade level, phonological awareness, emergent literacy, and parent education was accounted for. Evans et al. (2000) also failed to find a significant relationship.

The Current Study

Sénéchal and Le Fevre's (2002) model formed the theoretical basis for predictions tested in the current study. Studies that examined spelling development (Cunningham & Stanovich, 1993; Evans et al., 2000) were used to extend the model to include predictions about spelling development. The effects of age, gender, memory and non-verbal ability were controlled. It was expected that parent-child reading (measured as a composite of home literacy questionnaire items and TRT) would be directly related to receptive vocabulary and that this relationship would mediate any relationship between parent-child reading and children's subsequent word reading accuracy and rate. The frequency of parental teaching was expected to be directly related to Preschool letter knowledge and this relationship was expected to mediate any relationship between parental teaching and subsequent development in word reading accuracy and rate. Parent-child reading was expected to be related to spelling rate. We examined the extent to which letter knowledge mediated this relationship. The relationship between parent literacy teaching and spelling development was examined, but no specific predictions were made due to the lack of prior evidence. Consistent with Sénéchal and Le Fevre's model, neither parental reading nor teaching was expected to be directly related to Preschool phonological awareness, independently of letter knowledge and vocabulary. Any relationship between parent-child

reading and letter knowledge was expected to be explained by overlapping variance with control measures such as age and IQ and vocabulary. Overlapping variance with the control measures and letter knowledge was expected to explain any relationship between parental teaching and vocabulary.

Method

Participants

The initial sample comprised 143 Preschool children (79 males and 64 females; mean age = 5.36 years, $SD = 0.29$), who met the selection criteria of no serious developmental or intellectual impairments (parent and Pre-school teacher report) and English as their main language at home. The language requirement resulted in a largely Caucasian sample, with a few children of Asian or indigenous ethnicity. The three Preschools from which the children were drawn were mainly composed of low to middle class families. Preschool is a non-compulsory year prior to school entry; however, during the period of this research, 92.6% of children who attended the school in Grade 1 attended Preschool there (Education Queensland, 2006). Children attended Preschool for 12.5 hours spread over 2.5 days each week. There is no formal instruction in reading or writing; however, children are encouraged to write their names on art works, are regularly read to, and engage in games to promote phonological awareness, such as rhyming and clapping out syllables. Teachers will also assist children who want to write words (e.g., write the word for the child to copy). Formal instruction in reading and writing begins in Grade 1.

In Term 2 of Grade 1 (6 to 8 months later), 123 of those children (68 males, 55 females; mean age = 5.95 years, $SD = 0.30$) were available for re-testing, and 12 months later in Term 2 of Grade 2, 105 remained available for the third phase of testing (60 males, 45 females; mean age = 7.02 years, $SD = 0.29$). Thus, the attrition rate from Preschool to

Grade 2 was 26.6%, which is similar to the attrition rates reported in other longitudinal studies over similar periods (Leseman & de Jong, 1998; Sénéchal & Le Fevre, 2002). There were no significant differences between children who completed the study and those who did not on the early home literacy measures.

Procedure

School and written informed parental consent were obtained. All testing was conducted individually in a quiet room at the child's school over 6 to 7 sessions of 5 to 15 minutes each. Sessions were on different days over several weeks so fatigue was not a problem. Standardized testing procedures were followed for all commercially available tests. Administration procedures for other tests are described in the Materials section.

At the start of the 4th term of Preschool, parents completed the home literacy questionnaire, which included a Title Recognition Test (TRT). The children completed the Letter-Word Identification, Phonological Processing, and Memory tasks administered by the first author. In the Grade 1 and Grade 2 phases, these child measures were repeated, and children also completed the Reading and Spelling Rate measures. Reading and Spelling Rates were always conducted in separate sessions as they used the same word lists. In the Grade 1 phase, Non-verbal Ability and Receptive Vocabulary were also assessed.

Materials

Early Home Literacy Environment

Title Recognition Test (TRT). The parent-completed children's TRT included 20 popular age-appropriate children's book titles and 10 foils (Appendix A). The titles were derived from Angus and Robertson Bookworld's 100 all-time favorite children's books (1999) and previously used TRTs (Cunningham & Stanovich, 1993; Sénéchal et al., 1998). These titles also represented current best sellers. The score was the proportion of real titles

checked minus the proportion of foils checked, with negative scores entered as zero.

Cronbach's alpha was .74 for the real titles, .64 for the foils and .76 for the total scale.

Home Literacy Questionnaire. Parents responded regarding the frequency of reading to the child; the number of children's books; the frequency of parental teaching of literacy skills; and the frequency of library visits; as well as other non-literacy activities included as filler items (Appendix B). Questions were based on those previously used by Sénéchal et al. (1998) and Foy and Mann (2003). The home literacy questionnaire also asked parents about the child's interest in being read to. This was included because a lack of interest by the child may affect the extent to which parents engage in literacy activities with the child. Child interest was significantly correlated with the frequency of parent's reading (Crain-Thoreson & Dale, 1992; Dunning, Mason, & Stewart, 1994; Olofsson & Niedersoe, 1999), and with children's letter knowledge (Fritjers et al.), word and sentence reading (Olofsson & Niedersoe; Scarborough, Dobrich, & Hager, 1991), and language skills (Payne, Whitehurst, & Angell, 1994; Sénéchal et al., 1998). The questionnaire also requested demographic details (e.g., age, gender, and medical and developmental history).

Control Measures

Memory. Several authors argued that memory needs to be controlled in predictive studies of reading because of its significant relationship with early reading development (Mann & Liberman, 1984; Molfese, Molfese, & Modgline, 2001; Wagner & Torgesen, 1987). The auditory-verbal short-term memory measure was the Digit Span Forward subtest from the Dyslexia Early Screening Test (DEST; Nicolson & Fawcett, 1996), which is suitable for children aged 4.5 to 6.42 years. Nicolson and Fawcett reported one-week test-retest reliability for 5.5- to 6.5-year-olds of .63. We found 6-month test-retest reliability (Preschool to Grade 1) of .60. There were two trials at each digit span from two to nine

digits. Testing ceased when two trials at any given span were incorrect. The Memory score was the number of correct trials (maximum = 16).

Non-verbal Ability. This was included as a measure of children's analytic intelligence, and was measured using Raven's Colored Progressive Matrices (Raven, Court, & Raven, 1986). The reported Cronbach's alpha for an Australian sample (mean age 5.5 years) was .80 (Raven et al.). Our obtained alpha was .75.

Phonological Awareness

There were two measures of phonological awareness. Z-scores were formed for each and summed to give a composite Phonological Awareness score.

Rhyme and Alliteration Detection. The Rhymes subtest of the Cognitive Profiling System (CoPS; Singleton, Thomas, & Leedale, 1997) was used. CoPS is a computerized early screening test for children aged 4.5 years and over. Fawcett, Singleton, and Peer (1998) reported prediction rates for reading risk using the CoPS of over 90%, and acceptable false negative (12.0% to 16.7%) and false positive (around 2 %) rates. They found a strong correlation ($r = .52, p < .001$) between Rhymes performance at 5 years and single word recognition at 8 years. We found 6-month test-retest reliability (Preschool to Grade 1) of .72 and Cronbach's alphas at each phase of .87 to .93.

Participants chose a stimulus word from four choices that sounded like the target word on rhyme trials (8 trials) or that started with the same sound on alliteration trials (8 trials). On each trial, the spoken target and stimulus words were accompanied by pictures of the words on the computer screen, which remained in place until the child responded. This reduced memory demands. At Preschool, the children only completed the rhyme trials. At Grades 1 and 2, they completed the alliteration trials if they correctly completed the rhyme trials. Maximum possible scores were 8 at Preschool and 16 at Grades 1 and 2.

Phonological Segmentation. The Dyslexia Screening test Phonemic Segmentation subtest (Fawcett & Nicolson, 1996) involves deleting a phonological segment from a word read out by the experimenter (e.g., say *brain* without the /b/ to get *rain*). The deleted segment ranges from a syllable to a single phoneme within a blend, and varies across initial, medial, and final positions within the word. There were 12 trials. Fawcett & Nicolson reported one-week test-retest reliability for 6.5- to 12-year-olds of .88. We found a 6-month (Preschool to Grade 1) test-retest reliability of .62 and Cronbach's alphas of .57 to .61.

Receptive Vocabulary

The Peabody Picture Vocabulary Test- Revised Form M (PPVT-R; Dunn & Dunn, 1981) is a graded test suitable for 2.5- to 40-year-olds. Participants chose one of four pictures that best illustrated the meaning of a word spoken by the examiner. There were three training items first. Dunn and Dunn reported split half reliabilities of around .80 for 5- to 6.92-year-olds. We found a Spearman Brown-corrected split half reliability of .81.

Reading

Letter-Word Identification. The Letter-Word Identification subtest of the Woodcock Diagnostic Reading Battery (WDRB; Woodcock, 1997) is a graded list, beginning with selected letters (upper and lower case) and continuing with words of increasing difficulty. Reported internal consistency was .94 for 5- to 18-year-olds (Woodcock). We found Cronbach's alphas from .83 to .93 across the three phases.

Reading Rate. This measured word identification fluency. Participants read as many words as possible in one minute from a list based on the most frequent English words from the Dolch and Kucera-Francis sight-word lists (Dolch, 1936; Kucera & Francis, 1967; Appendix C). These words were also contained on the participating school's sight-word lists for Grades 1 to 3 so were the words that the children were expected to be learning.

Words were presented in order from highest frequency/easiest in three columns on A-4 pages in size 20 Berlin Sans FB font. The dependent measure was the number correctly identified in one minute (maximum = 120). Test-retest reliability over the 12 months from Grade 1 to Grade 2 was .79.

Spelling Rate

Children wrote to dictation as many words as possible in two minutes from the list of high frequency words used in the Reading Rate task (Appendix C). The experimenter read the word, repeated it in a phrase or sentence, and if the child had not yet finished writing the word, repeated the word again. Immediately the child finished one word, the next word was read out. The dependent measure was the number of correctly spelled words (maximum = 120). Test-retest reliability over the 12 months from Grade 1 to Grade 2 was .71.

Results

Literacy Practices in the Early Home Environment

Appendix B includes the percentages of parents choosing each response option for all items on the home literacy questionnaire. All parents reported reading to their child at least once per week, with 58.4% reading once or more per day. All families owned at least one book per child, with around 75% reporting they owned 50 or fewer. Only 7% of parents reported their child was not interested or only slightly interested in being read to. Twenty one percent reported they never took the child to the library (although all children visited the school library weekly). Most parents reported that they taught the child the alphabet (81.2%), to write their name (76.3%), and to read (57.4 %) often or very often. Thirteen parents (9.1%) did not report frequency for teaching their child to write their name because they reported that the child could already do that. Six of those parents also did not report the frequency of teaching the alphabet for that same reason. These responses were treated as

missing data and scores were replaced with the median in order to retain these participants in the sample. These children did not differ significantly on the outcome measures from the children whose parents had reported a frequency of doing these activities at the median for the sample, and performed significantly better on the outcome measures than those children whose parents reported a frequency for these activities at lower than the median. This supported our replacement of their missing data with the median. The mean score on the TRT was .29 ($SD = .16$; $M_{\text{real}} = .35$, $M_{\text{foils}} = .07$). In other words, after correcting for response bias, an average 29.19% of the real book titles were recognized (see Appendix A).

A principal components analysis (varimax rotation) of the home literacy questionnaire items and the TRT produced two factors, labeled Parental Teaching and Parental Reading (Table 1). Frequency of library visits was excluded as it did not load clearly on either factor. The two factors accounted for 57.82% of the variance in the six remaining items. To form a composite Parental Reading measure, reading item scores were first standardized and then summed. As the teaching items were all measured on the same response scale, initial standardizing was not required. They were simply summed to form the composite Parental Teaching measure. These two factors were only weakly correlated (3.35% shared variance). Child Reading Interest was significantly correlated with each; more strongly so with Parental Reading than with Parental Teaching (Table 2). However, it was not significantly correlated with any outcome measures, so was not included in any further analyses.

Table 2 presents the zero-order correlations and Table 3 the descriptive statistics for the control measures (Age, Gender, Memory, and Non-verbal Ability), the literacy and language measures, and the home literacy factors. Grade 1 Reading and Spelling Rates were square-root transformed to normalize the positively skewed distributions. These transformed variables were used in the analyses. At Preschool, Letter-Word Identification

was mainly a measure of letter identification (a score of 13 corresponds to knowing only letters; scores of 14 plus require word identification).

Mediation Analyses

Baron and Kenny's (1986) approach to testing mediation (see also recommendations of Kenny, Kashy, & Bolger, 1998; Shrout & Bolger, 2002) was used to test the extent to which indirect paths via the potential mediators (phonological awareness, letter identification and vocabulary) explained the relationship between Parent Reading and Teaching and subsequent literacy and language skills¹. Figure 1 represents the general mediation model tested. Path c is the direct pathway between the home environment predictors (Parental Reading or Teaching) and the language and literacy criterion measures (vocabulary, reading, and spelling). Paths a and b together represent the mediated or indirect path from the predictor to the criterion measure via the potential mediators (letter identification and vocabulary).

Baron and Kenny (1986) identified three necessary conditions for mediation. First, the predictor must account for significant variation in the hypothesized mediator (path a, Figure 1). Hierarchical multiple regression was used to examine this relationship between the home environment factors and the potential mediators. Note that in all of these analyses variance explained by the control measures was partialled out first. Second, the mediator must account for significant variation in the criterion (path b, Figure 1). This was tested by regressing the criterion measure on both the predictor and mediator. In line with the recommendations of Kenny et al. (1998), the second condition is satisfied if the mediator explains a significant independent component of variance in the criterion. The final condition (path c', Figure 1) is that when the relationships between the predictor and the mediator (path a) and between the mediator and the criterion (path b) are accounted for, a

previously significant relationship between the predictor and the criterion (path c) becomes non-significant (complete mediation) or is substantially reduced (partial mediation).

Standardized beta coefficients were examined to determine the extent to which the independent contribution of the predictor was reduced. Finally, we applied Sobel's (1982) test² (using Preacher & Leonardelli's, 2001, interactive calculation tool) to determine if this mediated path (path a and b) significantly differed from zero.

In all of the subsequent hierarchical regression analyses, control measures were entered at Step 1, prior to home literacy environment predictors, in order to initially partial out the variance they explained in the specific criterion measure. Control and predictor variables that were not significantly bivariately correlated with that criterion measure (see Table 2) were not included. Results for the control measures are shown in the regression summary tables, but not detailed further in text. Results with the Preschool emergent literacy skills (Phonological Awareness and Letter Identification) as criterion measures are presented first, followed by those with Receptive Vocabulary and then the Grade 1 and Grade 2 outcome measures as the criterion measures.

Prediction of Preschool Emergent Literacy Skills by Parental Literacy Practices

Based on Sénéchal and Le Fevre's (2002) model, neither Parental Reading nor Parental Teaching was expected to show a significant direct relationship with Phonological Awareness. Non-significant zero-order correlations (see Table 2) confirmed this. Thus, there were no direct paths between the parent practices and early phonological awareness.

Parental Teaching was expected to be directly related to Preschool Letter-Word Identification. The hierarchical regression analyses are summarized in Table 4a. At Step 2, Parent Teaching explained an additional 7.6% of the variance in Preschool Letter-Word Identification (significant path c, Figure 1), over that accounted for by the control measures

at Step 1. Sénéchal and Le Fevre (2002) found the direct relationship between Parental Teaching and emergent literacy was not explained by Vocabulary or Phonological Awareness. We tested these potential indirect relationships using more formal mediation analysis. Phonological Awareness was not significantly correlated with Parental Teaching (Table 2) so was not considered further as a mediator (i.e., non-significant path a). However, Vocabulary was significantly correlated with Parental Teaching (Table 2), and after partialling out variance due to the control measures, Parental Teaching independently explained 5.6% of the variance in Vocabulary, $F(1, 117) = 8.37, p = .005$ (significant path a). When Letter-Word Identification was regressed on both Parental Teaching and Vocabulary, Vocabulary independently explained 4.1% of the variance (significant path b). With this mediated path via Vocabulary accounted for, Parental Teaching still independently explained a significant 4.58% of the variance in Letter-Word Identification. Sobel's test results indicated that the mediated path via Vocabulary did not quite reach significance, $z = 1.94, p = .051$. Thus, consistent with Sénéchal and Le Fevre's model, there were direct paths from both Parental Teaching and Vocabulary to Preschool Letter-Word Identification.

Parental Reading was significantly correlated with Preschool Letter-Word Identification (Table 2). However, once differences in Age, Memory, and Non-verbal Ability were accounted for, this relationship became non-significant. Consistent with Sénéchal and Le Fevre's (2002) model, there was no direct path from Parental Reading to Letter-Word Identification.

Prediction of Receptive Vocabulary by Parental Literacy Practices

Sénéchal and Le Fevre's (2002) model predicted that Parental Reading would be related to Vocabulary, independently of relationships with emergent literacy and

phonological awareness. Table 4b summarizes these analyses. At Step 2, Parental Reading independently explained 5.6% of the variance in Vocabulary (significant path c). Neither Preschool Letter-Word Identification nor Phonological Awareness met Baron and Kenny's (1986) first condition for a mediator (significant path a from predictor to mediator), after partialling out variance explained by the control measures (Table 4a). Thus, there was evidence only for a significant direct path from Parental Reading to Vocabulary that was independent of emergent literacy skills and phonological awareness.

Parental Teaching was also significantly correlated with Vocabulary (Table 2). With variance due to the control measures explained, Parental Teaching explained 4.5% of the variance in Vocabulary (Table 4b). Preschool Letter-Word Identification was a potential mediator as it was significantly predicted by Parental Teaching (Table 4a; path a). When it was entered in the regression analysis with Parental Teaching, Preschool Letter-Word Identification independently explained 5.6% of the variance in Vocabulary, and Parental Teaching no longer explained a significant percentage of the variance. Thus, there was complete mediation by Letter-Word Identification. This mediated path was significantly different from zero, $z = 2.13$, $p = .033$. Thus, as predicted by Sénéchal and Le Fevre's model, there was only an indirect path from Parental Teaching via Preschool Letter-Word Identification to Vocabulary.

Prediction of Mid-Grade 1 Literacy Outcomes by Parental Literacy Practices

The criterion measures in this set of mediation analyses were Grade 1 Phonological Awareness, Letter-Word Identification, Reading Rate and Spelling Rate. Parental Reading showed no significant zero-order correlations with any of the Grade 1 outcome measures (Table 2); thus, no further analyses involving it were conducted. Parental Teaching was significantly correlated with all Grade 1 outcome measures, except Phonological

Awareness. Thus, no further analyses predicting Grade 1 Phonological Awareness were conducted and no paths from parental practices to Grade 1 Phonological Awareness were supported in the model. Table 5 summarizes the separate hierarchical regression analyses conducted for the other Grade 1 criterion measures. Preschool Letter-Word Identification was a potential mediator in all analyses based on significant zero-order correlations with each criterion measure (Table 2) and significant prediction by Parental Teaching (Table 4a).

Table 5a summarizes the regressions on Grade 1 Letter-Word Identification. At Step 2, Parental Teaching explained 6.4% of the variance in Grade 1 Letter-Word Identification. When Preschool Letter-Word Identification was also entered at Step 2, it independently explained 37.7% of the variance. Parental Teaching no longer explained a significant percentage of the variance, consistent with complete mediation by Preschool Letter-Word Identification. This mediated path was significant, $z = 3.32$, $p = .0009$. Thus, there was no direct path from Parental Teaching to Grade 1 Letter-Word Identification; only an indirect path via earlier Letter-Word Identification.

A similar pattern of results was obtained with Grade 1 Reading Rate as the criterion (Table 5b). At Step 2, Parental Teaching explained a further 7.9% of the variance in Grade 1 Reading Rate. When Preschool Letter-Word was also included in the regression analysis, it independently explained 29.5% of the variance and the percentage of variance explained by Parental Teaching became non-significant. This mediated path was significant, $z = 3.23$, $p = .001$. Thus, any relationship between Parental Teaching and Grade 1 Reading Rate was also completely mediated by Preschool Letter-Word Identification.

Similar results were also obtained in the regression on Grade 1 Spelling Rate (Table 5c). At Step 2, Parental Teaching explained 5.3% of the variance in Grade 1 Spelling Rate. Preschool Letter-Word Identification independently explained a further 18.9% of the

variance in Grade 1 Spelling Rate and reduced the variance explained by Parental Teaching to a non-significant level. This mediated path was significant, $z = 3.00$, $p = .003$. Thus, the only path supported was a mediated path from Parental Teaching via Preschool Letter-Word Identification to Grade 1 Spelling.

Prediction of Grade 2 Phonological Awareness, Reading, and Spelling

Parental Reading showed no significant zero-order correlations with any Grade 2 outcome measures (Table 2) and was not included in further analyses. However, there were significant correlations between Parental Teaching and all Grade 2 criterion measures. Preschool Letter-Word Identification was a potential mediator of these relationships.

Prediction of Grade 2 Phonological Awareness is detailed in Table 6a. At Step 2, Parental Teaching explained an additional 7.4% of the variance in Grade 2 Phonological Awareness. When both Parental Teaching and Preschool Letter-Word Identification were entered at Step 2, Preschool Letter Word Identification explained 15.29% of the variance and the contribution of Parental Teaching became non-significant. This mediated path was significant, $z = 2.90$, $p = .004$. Grade 1 Phonological Awareness was then added at Step 3. With it added, the mediated path remained significant, explaining 2.69% of the variance in Grade 2 Phonological Awareness. Grade 1 Phonological Awareness independently explained a further 11.7% of the variance. Thus, an indirect path from Parental Teaching via Preschool Letter-Word Identification to Grade 2 Phonological Awareness, that was independent of earlier phonological awareness, was supported in the model.

With Grade 2 Letter-Word Identification as the criterion measure, Parental Teaching explained an additional 4.63% of the variance at Step 2 (Table 6b). With both Preschool Letter-Word Identification and Parental Teaching entered at Step 2, Letter-Word Identification independently explained 17.06% of the variance, but the independent

contribution of Parental Teaching became non-significant. When Grade 1 Letter-Word Identification was added at Step 3, it independently explained 37.5% of the variance and Preschool Letter-Word Identification no longer explained a significant independent percentage of the variance. Thus, any variance in Grade 2 Letter-Word Identification explained by Parental Teaching overlapped with that already accounted for by the mediated path from Preschool to Grade 1 Letter-Word Identification. There was a further direct path from Grade 1 to 2 Letter-Word Identification.

Results were similar for the other criterion measures. At Step 2, Parental Teaching explained an additional 8.58% of the variance in Grade 2 Reading Rate (Table 6c). Adding Preschool Letter-Word Identification at Step 2 independently explained a further 18.75% of the variance and the independent contribution of Parental Teaching became non-significant. At Step 3, Grade 1 Reading Rate independently explained a further 39.69% to the variance and reduced the contribution of Preschool Letter-Word Identification to non-significance. Thus, a mediated path from Parental Teaching via Preschool Letter-Word Identification to Grade 1 Reading Rate and from there a direct path to Grade 2 Reading Rate was supported.

At Step 2, Parental Teaching independently explained 6.4% of the variance in Grade 2 Spelling Rate (Table 6d). Preschool Letter-Word Identification completely mediated this relationship and independently explained a further 10.5% of the variance. However, when Grade 1 Spelling Rate was also added the contribution of Preschool Letter-Word Identification became non-significant. Grade 1 Spelling Rate independently explained 23.72% of the variance in Grade 2 Spelling Rate. Thus, there was only a mediated path from Parental Teaching via Preschool Letter-Word Identification to Grade 1 Spelling Rate, which was then directly related to Grade 2 Spelling Rate.

Discussion

We examined the extent to which pre-school home literacy teaching and reading practices account for significant variance in emergent literacy skills (phonological awareness and letter identification) at Preschool and in language and literacy skills in Grade 1 and Grade 2. Based on results of previous studies and in particular the model proposed by Sénéchal and Le Fevre (2002), we examined the direct and mediated relationships between these home literacy factors and the outcome measures, when variance shared with age, gender, non-verbal ability and memory was controlled. The results indicated that parent-child reading and parent literacy teaching practices were only weakly related factors in the early home environment and that they showed different relationships to language and literacy outcomes. The model in Figure 2 summarizes our overall findings. This not only confirms the generalizability of Sénéchal and Le Fevre's model to an Australian sample drawn from schools servicing low to middle SES families, but extends it to include both accuracy and rate of word reading as well as spelling rate.

The home environments of the children prior to school entry included a number of literacy activities. In general, the findings were consistent with previous studies using samples from a variety of SES backgrounds in North America, the Netherlands, and England. Thus, the type of literacy practices that parents use with pre-school children generalize across nationalities, languages, and SES boundaries. The number of children's books owned was comparable with previous studies (Foy & Mann, 2003; Sénéchal et al., 1998). The frequency with which the parents read to their children during pre-school (approximately 60% reading daily) was also consistent with previous studies (Wood, 2002; Sénéchal et al.). However, more parents in our study than in previous studies (Wood; Haney & Hill, 2004) reported engaging in letter-based teaching activities. This difference may be

due to our sample being older and closer to the start of formal schooling (mean age = 5.36 years compared to 4 years in Wood's study and 3 to 5 years in Haney & Hill's study). As children near formal schooling, parents may be more likely to increase the frequency of letter teaching practices. There was an indication of this in Sénéchal et al.'s study, with the average frequency of parental teaching being *sometimes* for kindergarten children and *often* for the children beginning Grade 1. Furthermore, in their conclusions to the Baltimore Early Childhood Project, Serpell, Baker, and Sonnenschein (2005) stated that literacy goals were not of paramount importance to parents of pre-kindergarten aged children.

Consistent with Sénéchal and Le Fevre's (2002; Sénéchal et al, 1998) findings, parental reading and teaching practices loaded on different factors, with little shared variance. Unlike Sénéchal, Le Fevre and colleagues, we used both home literacy questionnaire items regarding reading frequency and a Title Recognition Test (TRT) as our parent-child reading factor. Fritjers et al.'s (2000) argued that more variance can be accounted for when multiple items are used. Indeed, in post hoc analyses, we found that the correlation between our composite measure and vocabulary (the only significant independent relationship found) was stronger ($r = .30, p = .001$) than was that with the TRT measure alone ($r = .18, p = .044$).

We found a clear difference in the relationships between Parental Reading and Teaching and the literacy and language measures. Consistent with Sénéchal and Le Fevre's (2002) model and other previous studies (e.g., Echols et al., 1996; Nagy & Anderson, 1984; Nagy, Herman, & Anderson, 1985; Scarborough & Dobrich, 1985; Sénéchal et al., 1998), parent-child reading was directly related to receptive vocabulary, independently of age, memory, non-verbal ability and emergent literacy skills. In contrast, Parental Teaching was not directly related to Vocabulary, but was directly related to Preschool letter identification.

The relationship between Parental Teaching and letter identification then mediated the relationships between parental teaching and all later measures.

We failed to find significant correlations between parent-child reading and children's later reading. Sénéchal and Le Fevre found that pre-school storybook reading was related to Grade 3 reading, but their measure was quite different to ours, incorporating reading vocabulary and reading comprehension. Thus, their result may be largely influenced by a relationship between storybook exposure and reading comprehension that emerges later, an outcome Leseman and de Jong (1998; de Jong & Leseman, 2001) also found. Furthermore, all of those studies found that relationship was fully mediated by early receptive language skills. Thus, parent-child reading was not directly related to later reading ability.

Studies with older children found that TRT/ART measures were generally related to reading, spelling, phonological processing, and orthographic processing, as well as to vocabulary (Byrne, Fielding-Barnsley, Ashley, & Larsen, 1997; Cipelewski & Stanovich, 1992; Cunningham & Stanovich, 1990, 1991; Echols et al., 1996; McBride-Chang, Manis, Seidenberg, Custodio, & Doi, 1993; Stanovich & West, 1989). It is possible that these different results between samples of beginner and more experienced readers arise because these recognition tests are quite different measures when used with pre-readers than when used with older independent readers. With pre-readers, parents complete the TRT/ART, so it is a measure of the parent's exposure to children's literature, and, thereby, a measure of parental reading to the child. For the pre-reading child, being read to is largely an oral language experience and so the TRT/ART is related to language development. For an older child who is reading independently and completes the TRT themselves, it is a measure of their own independent print exposure. Greater print exposure results in more experience in word and sentence decoding and recognition and in reading comprehension, as well as

ongoing exposure to new vocabulary. This explains the relationships between TRT/ART and a range of reading, spelling, and language measures in older samples that are not found when parent-completed TRT/ART measures are used in younger samples.

Consistent with Sénéchal and Le Fevre's (2002) model and other studies (Baker et al., 1998; Cunningham & Stanovich, 1993; Evans et al., 2000; Sénéchal et al., 1998), neither parent-child reading nor literacy teaching were significantly related to phonological awareness at Preschool or Grade 1. Parental teaching was significantly related to phonological awareness at Grade 2; however, this was completely explained by differences in letter identification at Preschool. Foy and Mann (2003) found a weak direct relationship between TRT and rhyme, but not phoneme, awareness. Our composite measure of phonological awareness included both rhyme and phoneme awareness, as did the measure used by Sénéchal, Le Fevre, and colleagues (Sénéchal & Le Fevre; Sénéchal et al.). This might explain why our studies did not find this relationship. This explanation is further supported by our post hoc analyses that revealed a significant weak correlation ($r = .19$) between our composite reading factor and rhyme awareness at Preschool (but not at later phases) that was independent of age, memory, and non-verbal ability. The correlation with phonological segmentation (more focused on phoneme awareness) was not significant.

One reason why stronger relationships with phonological awareness are not found in these studies may also be the parental practices asked about. Our reading questions, like the other studies (Foy & Mann, 2003; Sénéchal & Le Fevre, 2002) focused on story book reading and our teaching questions focused on letter- or word- based teaching, practices likely to foster vocabulary and letter knowledge, respectively, rather than phonological awareness. Previous studies found the frequency of rhyming activities (Fernandez-Fein & Baker, 1997) and of reading alphabet books (Murray, Stahl, & Ivey, 1996) were related to

children's phonological awareness. Future research needs to canvass a wider range of home literacy practices (including rhyming and letter sound teaching) to clarify whether parental literacy practices can foster phonological awareness.

In contrast to our results with parent-child reading, parental teaching was related to pre-school letter identification, independently of associations with age, memory, non-verbal ability and vocabulary. This relationship then completely mediated the relationships between parental teaching and later word reading and spelling measures, as well as phonological awareness. Theoretical models and empirical evidence supports letter knowledge around school-entry as an important predictor of early reading acquisition (Adams, 1995; Scarborough, 1998). Our results show that it is via their relationship with this emergent literacy skill, rather than with early phonological awareness, that home teaching practices (at least as we measured them) are related to Grade 1 word reading and spelling, and that is then directly related to Grade 2 word reading and spelling. The pattern of relationships with spelling was very similar to that with word reading, and the pattern of relationships was similar regardless of whether the outcome was word reading accuracy or rate. Thus, our results confirm that parental teaching practices are significant predictors of emergent literacy skills at the beginning of formal education, but only have an indirect effect on literacy skills after formal schooling commences. de Jong and Leseman (2001) also found that measures of the early home environment were related to literacy skills at the start of formal schooling but did not show direct relationships to these skills within one year of formal schooling.

We also included a measure of the child's interest in being read to (parent report). Previous studies found that this was related to the frequency of parent-child reading (Crain-Thoreson & Dale, 1992; Olofsson & Niedersoe, 1999) and loaded on the same factor

(Dunning et al., 1994). We found child interest was related to both parent-child reading and teaching, having a slightly stronger relationship with parent-child reading. However, unlike previous studies (Fritjers et al., 2000; Olofsson & Niedersoe, 1999; Payne et al., 1994; Scarborough et al., 1991; Sénéchal et al., 1998), we found no relationship between child interest and any of the outcome measures. This might be explained by characteristics of our measure. We had only a single item based on parent report, which was highly skewed (most parents reported their child was very interested).

Our results combined with previous studies confirm that similar early home literacy practices are engaged in across a range of SES and cultural backgrounds, and show similar relationships with children's language and literacy outcomes. This is consistent with Bus et al.'s (1995) conclusion that the effects of home literacy practices did not differ among SES; even in low SES families more shared reading had a positive impact on children's outcomes. However, in the Baltimore Early Childhood Project, Serpell et al. (2005) found home literacy practices did differ with SES. Therefore, it is a limitation of our study that we did not directly measure SES and compare practices and relationships across SES groups. Notwithstanding that, a major conclusion of the Baltimore Early Childhood Project was that parental practices and beliefs (what they called, the intimate culture) were more important to literacy development than SES. After controlling for parent education, an indicator of SES, Sénéchal and Le Fevre (2002) also found that parent literacy practices were independently related to the language and literacy outcome measures. Burgess (2005) found that a complex network of environmental, educational, and attitudinal variables, not just SES, explained the quality of early home literacy environments provided by teen mothers.

This study adds to the evidence that pre-school literacy teaching practices in the home environment are more important than storybook reading in fostering emergent literacy

skills, and that parents should be encouraged to do more than just read to their children. However, further work is needed to determine the factors that predict parents choosing to engage in more formal literacy teaching over, or in addition to, storybook reading. It may be important for future research to consider this within a developmental context. For example, what specific teaching practices are important for fostering emergent literacy skills at different developmental points prior to school-entry and to what extent are parents sensitive to their child's developing literacy skills, adapting their literacy practices accordingly? Longitudinal studies that begin at an earlier age and that examine a broader range of home literacy practices, ideally with both self-report and observational measures, are needed to clarify developmental changes in the type of practices used and in their relationships to different literacy and language outcomes. We only examined practices in the few months prior to school-entry and only examined storybook reading and letter-based teaching activities. Nursery rhymes and other sound games may be more important practices with younger children (for example, see Bradley & Bryant, 1983) and may be more strongly related to the other important pre-literacy skill of phonological awareness.

Parent factors may influence the type of practices engaged in and their effectiveness in promoting children's literacy development. In the current study, we did not determine which parent completed the home literacy environment questionnaire. It would be of interest in future studies to determine whether fathers and mothers differ in the practices they engage in. Differences in parents' own literacy skills and interest levels may also contribute to differences in the practices engaged in and their effects on child outcomes.

Another factor that may be important, but which was also not addressed in the current study, is the emotional quality of the parent-child literacy interactions (Baker et al., 1998; de Jong & Leseman, 2001; Serpell et al., 2005). de Jong & Leseman found that the social-

emotional quality during parent-child reading was related to vocabulary development and, thereby, to later reading comprehension. Serpell et al. found that the social-emotional quality was also related to the child's reading motivation, and, thereby, to reading frequency once at school. More frequent reading by the child once at school was related to better reading achievement. However, little is currently known about the way social-emotional quality during parental literacy teaching practices is related to children's literacy outcomes. It is possible that unless the parent feels comfortable and competent engaging the child in literacy teaching practices, the social-emotional quality will be less than optimal, and the outcomes may be less satisfactory. This is yet another way in which parents' own literacy skill and interest levels might be related to children's literacy outcomes.

In conclusion, despite our finding that home literacy teaching practices are more important to subsequent literacy development than parent-child reading, reading should not be dismissed in favor of formal teaching practices. Parent-child reading is related to greater vocabulary development, which others have shown is an important predictor of later reading comprehension. Depending on a positive socio-emotional context, parent-child reading is also important in fostering the child's own motivation, which has important long term consequences for their reading as well. While the direct relationships of parental teaching practices are more obvious earlier in literacy emergence, the indirect relationships of early parent reading may not become apparent until the focus of reading changes from basic word decoding to comprehension, around Grade 3. Thus, parents should be encouraged to engage in both reading and teaching activities to optimize a range of important literacy-related outcomes after school entry.

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Footnotes

¹ Vocabulary functioned as an initial outcome measure and then as a mediator between home literacy practices and later outcome measures

² Sobel's formula: $z\text{-value} = a*b/\text{SQRT}(b^2*s_a^2 + a^2*s_b^2)$, where SQRT = square root, a = raw regression coefficient (B) for path a, s_a = standard error of a (SE B), b = raw regression coefficient for path b, s_b = standard error of b

Appendix A

Percentage of Parents ($N = 143$) Indicating Recognition for Book and Foil Titles on the

TRT

Real Titles	Percentage Recognised	Foils	Percentage Recognised
Green Eggs and Ham	53.5	How Andrew Saved the Day	3.5
Corduroy	10.6	Toby the Terrible Tip Truck	3.5
Winnie the Pooh	83.1	Are You My Father?	9.9
Possum Magic	28.9	Postman Pat at the Beach	19.0
Tooth Fairy	22.5	Old Fox	2.8
The Very Hungry Caterpillar	68.3	Hello Morning, Hello Day	0.7
Are you my Mother?	38.7	Dairy Wood	2.1
The Velveteen Rabbit	18.3	The Very Naughty Fairy	2.1
The Cat in the Hat	68.3	Elephant Magic	2.8
Mike Mulligan and His Steam Shovel	4.9	Thomas the Tank Engine's White Christmas	19.7
Koala Lou	9.2		
Where's Spot?	76.8		
The Complete Adventures of Blinky Bill	33.8		
Hairy MacLary from Donaldson's Dairy	54.2		
Where the Wild Things Are	18.3		
Who Sank the Boat?	12.0		
Harry the Dirty Dog	38.0		
We're Going on a Bear Hunt	38.0		
Saggy Baggy Elephant	22.5		
Just Me and My Dad	8.5		

Appendix B

Home Literacy Environment Questions and Frequencies of Responses

1. In a typical week, how often do you, or other members of the family, read to your child?

At bedtime:	<input type="checkbox"/>	never	8.4%
	<input type="checkbox"/>	Once	9.1%
	<input type="checkbox"/>	2 times	11.9%
	<input type="checkbox"/>	3 times	10.5%
	<input type="checkbox"/>	4 times	14.7%
	<input type="checkbox"/>	5 times	17.5%
	<input type="checkbox"/>	6 times	8.4%
	<input type="checkbox"/>	7 times	19.6%

At other times:

<input type="checkbox"/>	never	2.8%
<input type="checkbox"/>	Once	12.6%
<input type="checkbox"/>	2 times	18.9%
<input type="checkbox"/>	3 times	28.0%
<input type="checkbox"/>	4 times	14.7%
<input type="checkbox"/>	5 times	10.5%
<input type="checkbox"/>	6 times	1.4%
<input type="checkbox"/>	7 times	5.6%
<input type="checkbox"/>	more often. How often? _____	5.6%

2. Please estimate the number of children’s books per child available in your household?

<input type="checkbox"/>	1- 5	2.1%	<input type="checkbox"/>	41 – 50	15.3%
<input type="checkbox"/>	6 – 10	3.5%	<input type="checkbox"/>	51 – 60	8.3%
<input type="checkbox"/>	11 – 15	16.0%	<input type="checkbox"/>	61 – 70	1.4%
<input type="checkbox"/>	16 – 20	8.3%	<input type="checkbox"/>	71 – 80	0.7%
<input type="checkbox"/>	21 – 25	9.7%	<input type="checkbox"/>	81 – 90	0.0%
<input type="checkbox"/>	26 – 30	4.2%	<input type="checkbox"/>	91 – 100+	13.9%
<input type="checkbox"/>	31 – 40	16.7%			

3. When being read a story, how interested does your child appear to be?

<input type="checkbox"/>	Not interested at all	0.7%
<input type="checkbox"/>	Slightly interested	6.3%
<input type="checkbox"/>	Quite interested	25.2%
<input type="checkbox"/>	Very interested	67.8%
<input type="checkbox"/>	Don’t know	0.0%

4. Please indicate how often, on average, your child would normally engage in the following activities (filler items not reported here). Please circle the appropriate number, where 1 means *daily* and 6 means *never*.

	<i>Daily</i>	<i>Weekly</i>	<i>Fortnightly</i>	<i>Monthly</i>	<i>Less than Monthly</i>	<i>Never</i>
• Go to Library	1	2	3	4	5	6
Percent Responding:	0.0	35.7	11.9	15.4	16.1	21.0

5. In a typical week, how often do you, or another family member, engage in the following activities (filler items not reported here)? Please circle a number from 1 – 5 where 1 means *never* and 5 means *very often*. If you don't teach an activity because your child knows how to do it already, circle 6 = NA for *not applicable*

	<i>Never</i>	<i>Rarely</i>	<i>Sometimes</i>	<i>Often</i>	<i>Very often</i>	<i>NA</i>
I/we teach my child:						
(Percent responding)						
• the alphabet letters	0	1.4	13.3	33.6	47.6	4.2
• how to write own name	0	0.7	14.0	31.5	44.8	9.1
• how to read words	2.1	5.6	35.0	28.0	29.4	0.0

Appendix C

Reading and Spelling Rate Word Lists

the	this	we	new	before	get
of	had	him	some	must	here
and	not	been	could	where	both
to	are	has	these	much	under
a	but	when	two	your	never
in	from	who	many	well	know
that	or	will	then	down	us
is	have	no	do	because	old
was	an	if	first	just	hurt
he	they	out	any	those	wash
for	which	so	my	how	thank
it	one	said	now	too	sing
with	you	what	like	little	fly
as	were	up	our	good	laugh
his	her	its	over	very	jump
on	all	about	me	make	ate
be	she	into	made	own	more
at	there	them	after	see	than
by	would	can	did	work	other
I	their	only	many	long	time

Table 1

*Principal Components Analysis of Items Measuring Early Home Reading Environment**(N = 143)*

Item	Factor Loadings	
	Parental Teaching	Parental Reading
Frequency teach alphabet	.83	.01
Frequency teach write name	.76	.12
Frequency teach reading	.72	.06
Number children's book per child	.14	.78
Children's TRT score	-.19	.73
Frequency reading per week	.29	.63
Eigenvalues	2.08	1.39
Percentage of Variance	34.64	23.18
Kaiser-Meyer-Olkin measure	0.62	
Bartlett's test of sphericity	$\chi^2 (15) = 126.53, p < .0001$	

Note. 0.50 was considered the minimal factor loading required to be significant at an alpha level of .05 (Hair, Anderson, Tatham, & Black, 1998).

Table 2

Zero-order Correlations between Early Home Literacy Practices, Control Measures, Reading, Spelling, Phonological Processing, and Vocabulary

	1	2	3 ^a	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
1. TEACH	--																			
2. READ	.18*	--																		
3. GENDER ^a	-.13	-.09	--																	
4. AGE	.12	.13	-.07	--																
5. pMEM	-.13	.07	.11	.08	--															
6. 1MEM	-.12	.04	.05	-.07	.60*	--														
7. 2MEM	-.05	.23*	.17	-.05	.56*	.59*	--													
8. NONVERB	.04	.20*	.14	.25**	.17	.10	.24*	--												
9. pLettWord	.24**	.17*	-.02	.28**	.17*	.23*	.16	.33**	--											
10. 1LettWord	.22*	.04	-.07	.27**	.15	.24**	.18	.17	.69**	--										
11. 2LettWord	.20*	-.03	.04	.22*	.20*	.26**	.16	.21*	.56**	.73**	--									
12. 1ReadRate	.28**	.08	-.10	.25**	.10	.21*	.10	.17	.67**	.83**	.83**	--								
13. 2ReadRate	.19*	-.02	-.06	.18	.16	.22*	.17	.04	.48**	.71**	.81**	.80*	--							
14. 1SpellRate	.25**	.12	-.17*	.26**	.09	.22**	.04	.09	.58**	.72**	.67**	.81**	.65**	--						
15. 2 SpellRate	.23**	-.03	-.11	.22*	.21*	.28**	.15	.08	.47**	.70**	.71**	.75**	.78**	.71*	--					
16. pPHON	.13	.14	.05	.27**	.32**	.28**	.22**	.22*	.53**	.41**	.44**	.43**	.39**	.47**	.32**	--				
17. 1PHON	.17	.11	.09	.18*	.28**	.34**	.27**	.20*	.54**	.55**	.52**	.50**	.47**	.53**	.45**	.75**	--			
18. 2PHON	.22**	.02	.04	.14	.17	.30**	.18	.19	.51**	.60**	.71**	.65**	.63**	.57**	.59**	.52**	.62**	--		
19. VOCAB	.24**	.30**	-.05	.24**	.21*	.14	.20*	.33**	.40**	.43**	.32**	.34**	.30**	.39**	.29**	.35**	.32**	.27**	--	
20. INTEREST	.17*	.32**	-.13	-.01	.04	.02	.01	.02	.06	-.03	.00	-.09	-.02	-.07	-.02	.04	-.01	.11	.13	--

Note. TEACH = Parental Teaching, READ = Parental Reading, MEM = Memory, p = Preschool, 1 = Grade, 2 = Grade 2, NONVERB= Non-verbal Ability, LettWord = Letter-Word Identification, PHON = Phonological Awareness, VOCAB = Receptive Vocabulary, INTEREST = parent report of child interest in being read to

* $p < .05$; ** $p < .01$

^a Categorical variable, Kendall's tau reported

Table 3

Descriptive Statistics of Control Measures, Predictors and Outcome Literacy

Measures	Mean	SD	Range
Preschool Age (years)	5.36	0.29	4.83 – 6.17
Grade 1 Age (years)	5.95	0.30	5.41 – 6.75
Grade 2 Age (years)	7.02	0.29	6.50 – 7.59
Preschool Memory	5.19	1.44	2.00 – 9.00
Grade 1 Memory	5.90	1.42	2.00 – 11.00
Grade 2 Memory	6.74	1.55	4.00 – 10.00
Non-verbal Ability ^a	108.43	10.39	81.00 – 135.00
Receptive Vocabulary ^a	101.57	12.15	72.00 – 129.00
Preschool Phonological Aware. ^a	0.20	1.76	-3.57 – 3.70
Gr. 1 Phonological Awareness ^a	0.15	1.64	-2.99 – 3.89
Gr. 2 Phonological Awareness ^a	0.00	1.62	-5.56 – 2.33
Preschool Letter-Word Id.	10.23	3.05	4.00 – 20.00
Gr. 1 Letter-Word Identification	14.63	3.69	5.00 – 28.00
Gr. 2 Letter-Word Identification	27.59	7.18	12.00 – 46.00
Gr. 1 Reading Rate	18.06	14.33	0.00 – 78.00
Gr. 2 Reading Rate	57.13	24.52	8.00 – 120.00
Gr. 1 Spelling Rate	8.05	5.72	0.00 – 30.00
Gr. 2 Spelling Rate	22.42	7.23	3.00 – 48.00
Parental Teaching	12.51	1.97	7.00 – 15.00
Parental Reading	15.57	5.78	5.15 – 30.60

^aStandardised scores

Table 4

Hierarchical Regression Analyses for Predicting Preschool Letter-Word Identification and Grade 1 Receptive Vocabulary

Variable	B (SE B)	β	p
a) Criterion measure = Preschool Letter-Word Identification ($N = 122$)			
Step 1. Age	1.76 (0.87)	.18	.044*
Preschool Memory	0.25 (0.18)	.12	.161
Non-verbal	0.18 (0.06)	.27	.003*
$R^2 = .153^*$, $F(3, 118) = 7.08$, $p < .0001$			
Step 2. Parent Teach	0.43 (0.13)	.28	.001*
$\Delta R^2 = .076^*$, $F(1, 117) = 11.59$, $p = .001$			
Step 3. Parent Teach	0.34 (0.13)	.23	.008*
Vocabulary	0.06 (0.02)	.23	.011*
$\Delta R^2 = .041^*$, $F(1, 116) = 6.60$, $p = .011$			
Step 2. Parent Read	0.12 (0.12)	.09	.307
$\Delta R^2 = .008$, $p = .291$			
b) Criterion measure = Vocabulary ($N = 122$)			
Step 1. Age	6.49 (3.47)	.17	.064
Non-verbal	0.77 (0.23)	.29	.001*
$R^2 = .136^*$, $F(2, 119) = 9.40$, $p < .0001$			

	Variable	B (SE B)	β	p
Step 2.	Parent Read	1.30 (0.46)	.24	.005*
		$\Delta R^2 = .056^*$, $F(1, 118) = 8.12$, $p = .005$		
Step 2.	Parent Teach	1.29 (0.51)	.21	.012*
		$\Delta R^2 = .045^*$, $F(1, 118) = 6.46$, $p = .012$		
Step3.	Parent Teach	0.88 (0.51)	.14	.09
	PreLettWord Id	1.06 (0.36)	.27	.004*
		$\Delta R^2 = .056^*$, $F(1, 117) = 8.55$, $p = .004$		

^aThe contributions of the control measures beyond step 1 are not included in any of the summaries in the interests of economy of presentation and because they are not the focus of the analysis

* $p < .05$

Table 5

Hierarchical Regression Analyses for Predicting Grade 1 Reading and Spelling

Variable	B (SE B)	β	<i>p</i>
a) Criterion measure = Grade 1 Letter-Word Identification (<i>N</i> = 123)			
Step 1. Age	3.59 (0.98)	.31	<.0001*
Gr1 Memory	0.63 (0.20)	.26	.002*
$R^2 = .153^*$, $F(2, 120) = 10.87$, $p < .0001$			
Step 2. Parent Teach	0.46 (0.15)	.26	.002*
$\Delta R^2 = .064^*$, $F(1, 119) = 9.79$, $p = .002$			
Step 3. Parent Teach	0.10 (0.11)	.06	.363
Pre LettWord Id	0.82 (0.08)	.69	<.0001*
$\Delta R^2 = .377^*$, $F(1, 118) = 109.99$, $p < .0001$			
b) Criterion measure = Grade 1 Reading Rate (<i>N</i> = 121)			
Step 1. Age	1.58 (0.50)	.27	.002*
Gr1 Memory	0.27 (0.10)	.23	.009*
$R^2 = .118^*$, $F(2, 120) = 8.05$, $p = .001$			
Step 2. Parent Teach	0.25 (0.07)	.28	.001*
$\Delta R^2 = .079^*$, $F(1, 119) = 11.70$, $p = .001$			
Step 3. Parent Teach	0.10 (0.06)	.11	.126
Pre LettWord Id	0.36 (0.04)	.61	<.0001*
$\Delta R^2 = .295^*$, $F(1, 118) = 68.61$, $p < .0001$			

Variable	B (SE B)	β	p
c) Criterion measure = Grade 1 Spelling Rate ($N = 123$)			
Step 1. Age	1.02 (0.31)	.28	.001*
Gr1 Memory	0.18 (0.06)	.24	.004*
Gender ^a	-0.46 (0.18)	-.21	.012*
$R^2 = .174^*$, $F(3, 119) = 8.35$, $p < .0001$			
Step 2. Parent Teach	0.13 (0.05)	.23	.005*
$\Delta R^2 = .053^*$, $F(1, 118) = 8.03$, $p = .005$			
Step 3. Parent Teach	0.05 (0.04)	.09	.217
Pre LettWord Id	0.18 (0.03)	.49	<.0001*
$\Delta R^2 = .189^*$, $F(1, 118) = 11.81$, $p = .001$			

^a Male = 1, Female = 0

* $p < .05$

Table 6

Hierarchical Regression Analyses Predicting Grade 2 Phonological Awareness, Reading, and Spelling

Variable	B (SE B)	β	p
a) Criterion measure = Grade 2 Phonological Awareness ($N = 105$)			
Step 1. Gr 1 Memory	0.34 (0.11)	.30	.002*
$R^2 = .09^*$, $F(1, 101) = 10.02$, $p = .002$			
Step 2. Parent Teach	0.23 (0.08)	.28	.004*
$\Delta R^2 = .074^*$, $F(1, 100) = 8.84$, $p = .004$			
Step 2. Parent Teach	0.13 (0.07)	.15	.096
Pre LettWord Id	0.24 (0.05)	.42	<.0001*
$\Delta R^2 = .227^*$, $F(2, 99) = 16.47$, $p < .0001$			
Step 3. Parent Teach	0.09 (0.07)	.10	.206
Pre LettWord Id	0.12 (0.53)	.20	.034*
Gr 1 Phon Aware	0.43 (0.10)	.44	<.0001*
$\Delta R^2 = .117^*$, $F(1, 98) = 20.30$, $p < .0001$			

Variable	B (SE B)	β	p
b) Criterion measure = Grade 2 Letter-Word Identification ($N = 106$)			
Step 1. Age	4.60 (2.33)	.19	.051
Gr 1 Memory	1.16 (0.47)	.23	.015*
Non-verbal	0.21 (0.15)	.13	.182
$R^2 = .128^*$, $F(3, 102) = 4.98$, $p = .003$			
Step 2. Parent Teach	0.82 (0.35)	.22	.02*
$\Delta R^2 = .046^*$, $F(1, 101) = 5.63$, $p < .0001$			
Step 2. Parent Teach	0.37 (0.32)	.10	.255
Pre LettWord Id	1.21 (0.24)	.48	<.0001*
$\Delta R^2 = .217^*$, $F(2, 100) = 16.53$, $p < .0001$			
Step 3. Parent Teach	0.28 (0.27)	.07	.305
Pre LettWord Id	-0.02 (0.27)	-.01	.942
Gr 1 LettWord Id	1.48 (0.22)	.69	<.0001*
$\Delta R^2 = .204^*$, $F(1, 99) = 44.82$, $p < .0001$			
c) Criterion measure = Grade 2 Reading Rate ($N = 104$)			
Step 1. Gr 1 Memory	3.94 (1.63)	.24	.017*
$\Delta R^2 = .056^*$, $F(1, 100) = 5.88$, $p = .017$			

Variable	B (SE B)	β	p
Step 2. Parent Teach	3.80 (1.21)	.30	.002*
$\Delta R^2 = .086^*$, $F(1, 99) = 9.93$, $p = .002$			
Step 2. Parent Teach	2.07 (1.12)	.16	.068
Pre LettWord Id	3.95 (0.76)	.46	<.0001*
$\Delta R^2 = .273^*$, $F(2, 98) = 19.96$, $p < .0001$			
Step 3. Parent Teach	0.51 (0.73)	.04	.491
Pre LettWord Id	-0.37 (0.61)	-.04	.54
Gr 1 Read Rate	12.15 (1.03)	.85	<.0001*
$\Delta R^2 = .397^*$, $F(1, 97) = 140.31$, $p < .0001$			
d) Criterion measure = Grade 2 Spelling Rate ($N = 105$)			
Step 1. Age	5.27 (2.29)	.21	.024*
Gr 1 Memory	1.38 (0.47)	.27	.004*
$R^2 = .123^*$, $F(2, 102) = 7.13$, $p = .001$			
Step 2. Parent Teach	0.97 (0.34)	.26	.006*
$\Delta R^2 = .064^*$, $F(1, 101) = 7.95$, $p = .006$			
Step 2. Parent Teach	0.61 (0.34)	.16	.072
Pre LettWord Id	0.91 (0.24)	.36	<.0001*
$\Delta R^2 = .169^*$, $F(2, 100) = 11.94$, $p < .0001$			

Variable	B (SE B)	β	p
Step 3. Parent Teach	0.29 (0.28)	.08	.303
Pre LettWord Id	0.20 (0.22)	.08	.376
Gr 1 Spell Rate	4.20 (0.60)	.62	<.0001*

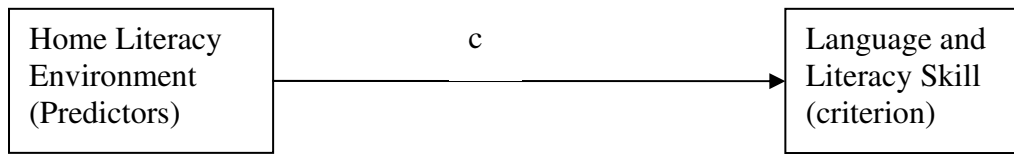
$\Delta R^2 = .237^*$, $F(1, 99) = 49.79$, $p < .0001$

* $p < .05$

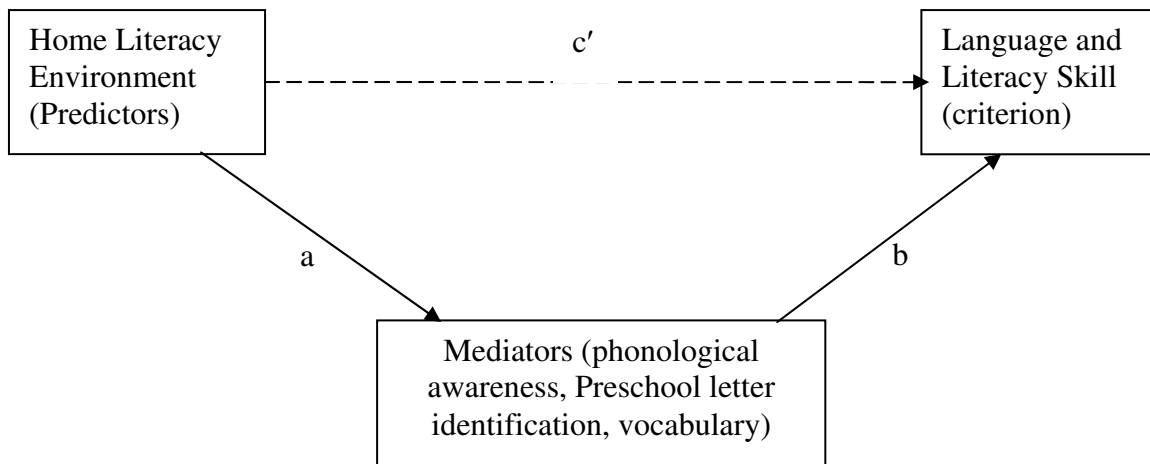
Figure Caption

Figure 1. Generic mediation model being tested (based on Baron & Kenny, 1986).

Figure 2. Model of the relationships between early home reading and teaching practices and child literacy and language outcomes, after the effects of age, gender, memory and non-verbal ability were partialled out. Curved arrows represent paths from Sénéchal and Le Fevre's (2002) model that we did not rigorously test due to the lack of relationships with the focal parent factors, but for which we found significant zero-order correlations.



a) Direct Pathway



b) Indirect or mediated pathway

