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Environmental, Motivational, and Cognitive Predictors of Emergent Literacy and Reading Skills

by

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Dedicated

to

my late parents Arni and Dorothy,

who instilled in me the value of hard work;

to

Dr. R. Parrila

who guided me through the research process and taught me to be a critical thinker;

and to

my husband Jason,

who encouraged and supported me.

Abstract

This thesis consists of three separate papers broadly examining how different environmental and child variables affect language and literacy acquisition in two or more orthographies. The first paper is a quantitative meta-analysis of studies that have examined the effects of shared book reading on language, emergent literacy skills, and reading achievement with preschool children. The results suggest that shared book reading explained approximately 7% of variance in all the language and literacy measures combined, which is comparable to earlier studies. The mean effect size of shared book reading was slightly larger for the combined language measures ($d = 0.77$) than for the combined emergent literacy measures ($d = 0.57$), or the combined reading achievement measures ($d = 0.63$). An examination of the effects of shared book reading on specific language, emergent literacy, and reading skills revealed that shared book reading is more related to receptive language than to expressive language, to letter knowledge and print concepts than to listening comprehension and phonological awareness, and to word identification than to decoding and reading comprehension.

The second paper examines the effects of home literacy (shared book reading, teaching activities, and number of books), children's task-focused behaviour, and parents' beliefs and expectations about their child's reading and academic ability on Kindergarten children's ($N = 61$) phonological sensitivity and letter knowledge and on Grade 1 word reading. The results showed that after controlling for nonverbal IQ and vocabulary, parent teaching activities prior to

Kindergarten predicted significantly letter knowledge; parents' beliefs about their children's reading ability predicted significantly phonological sensitivity and Kindergarten word reading; and children's task-focused behaviour predicted significantly letter knowledge and Kindergarten and Grade 1 word reading. Shared book reading did not account for unique variance in any of the dependent variables.

The third paper reports on a cross-linguistic longitudinal study that examines the predictors of word reading fluency, passage comprehension, and spelling in children learning to read in an orthographically inconsistent language (English) and in an orthographically consistent language (Greek). Letter knowledge and vocabulary skills of 45 English-speaking children and 67 Greek-speaking children attending Kindergarten were examined. The parents of the children responded to a questionnaire on home literacy activities and the teachers filled out a questionnaire on children's task-focused behaviour. The same children were reassessed on word decoding and reading fluency in Grade 1, and on reading fluency, passage comprehension, and spelling in Grade 3. Results indicated that home literacy factors did not directly predict Grade 3 reading or spelling skills for either the English- or Greek-speaking samples. Task-focused behaviour directly predicted spelling for the Greek-speaking sample. Vocabulary was more important for reading and spelling in English than in Greek. Letter knowledge was more important for spelling in Greek and for passage comprehension in English.

This thesis concludes with a general discussion that tries to integrate the results of the studies within current theoretical models of reading acquisition.

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I. INTRODUCTION

The ability to read unfamiliar words is one of the most important academic challenges children encounter during their elementary schooling. Over the past decade, researchers have developed a better understanding of the emergent literacy skills that predict reading achievement. Among the emergent literacy skills, letter knowledge and phonological processing, particularly phonological sensitivity and naming speed, have been shown to be good predictors of reading acquisition (Bishop, 2003; Schatschneider, Fletcher, Francis, Carlson, & Foorman, 2004). Other factors have also been shown to predict reading achievement, including shared book reading (Bus, van IJzendoorn, & Pellegrini, 1995), parents' beliefs and expectations (Entwisle & Hayduk, 1988), and children's task-focused behaviours (Aunola, Nurmi, Niemi, Lerkkanen, & Puttonen, 2002; Hagtvet, 2000). Despite the knowledge of the importance of emergent literacy skills, environmental factors, and behavioural factors to reading development, there are significant unresolved issues, such as: (a) How important is shared-book reading to language, emergent literacy, and reading development? (b) What is the unique contribution of environmental and behavioural factors on emergent literacy and reading skills when they are simultaneously examined? and (c) Do environmental and behavioural factors contribute to the development of reading equally for two languages that vary in orthographic consistency?

This dissertation consists of three separate studies that deal with the development of children's emergent literacy and reading skills. In the first study (Chapter II) the effects of shared book reading on specific language, emergent

literacy, and reading skills is examined. In the second study (Chapter III) the relation of environmental factors (home literacy environment and parents' beliefs) and behavioural factors (children's task-focused behaviour) on emergent literacy skills (phonological sensitivity and letter knowledge) and Grade 1 word reading skills is examined. The third study (Chapter IV) focuses on the environmental and behavioural predictors of reading and spelling in Grade 3. Moreover, in the third study how the environmental and behavioural factors along with letter knowledge relate to Grade 3 reading in two orthographically different languages is also examined. Thus, in their distinct ways, all three studies address the question: What are the predictors of emergent literacy and reading skills?

Shared Book Reading, Language, Emergent Literacy, and Reading Skills

Presented in Chapter II is an as yet unpublished study that focuses on the effects of shared book reading on specific language, emergent literacy, and reading skills. The chapter begins with a summary of the findings of a review (Scarborough & Dobrich, 1994) and a formal meta-analysis (Bus et al., 1995), conducted in the mid 1990's, on the effects of parent-preschooler shared book reading. Although the authors of the studies agreed on the overall variance parent-preschooler shared book reading explains in a combined measure of language, emergent literacy, and reading achievement, an examination of language, emergent literacy, and reading achievement separately resulted in different conclusions. The authors of the two articles further disagreed on the importance of shared book reading to preschoolers. Bus et al. concluded that shared book reading is very important, whereas Scarborough and Dobrich raised doubts about

its unique importance for reading acquisition. The importance of shared book reading was further questioned by other researchers (e.g., Burgess, Hecht, & Lonigan, 2002) who suggested that the associations found by Bus et al. and Scarborough and Dobrich between children's literacy and shared book reading were small to modest in size.

Lonigan (1994) and Dunning, Mason, and Stewart (1994) claimed that there is reason to be more optimistic about the effects of reading to preschoolers. They argued that the studies included in the review and meta-analysis had severe methodological and statistical problems. Thus, Chapter II goes on to describe the methodological and statistical problems identified by Lonigan and Dunning et al. and how research since the mid 1990's has addressed some of those criticisms. What is still unclear, however, is whether the methodological flaws of the studies were the cause of the small effects found in the 1994 review and 1995 meta-analysis.

The aims of Chapter II are to conduct a meta-analysis of the articles published since 1994 in order to determine: (a) the relations between shared book reading and language, emergent literacy, and reading achievement; (b) whether shared book reading is related to some aspects of language, emergent literacy, and reading achievement, but not to others; and (c) whether different predictors—methodological quality of the study, sample size, socioeconomic status, type of shared book reading measure, age of child at time of outcome measure, or publication year—explain any variance in the relationships between shared book reading and language, emergent literacy, and reading achievement.

One major limitation of a meta-analysis is that it does not take into consideration whether the effects of shared book reading would be significant after other measures that are also known to predict emergent literacy and reading skills are taken into account. Thus, the aim of Chapter III is to simultaneously examine how factors that have been shown in separate studies to predict emergent literacy and reading skills—home literacy, parents' beliefs and expectations, and children's task-focused behaviours—are associated with Kindergarten emergent literacy skills and word reading in Kindergarten and Grade 1. Chapter IV examines how home literacy, children's task-focused behaviour, and letter knowledge uniquely and jointly predict reading and spelling skills in Grade 3 for two orthographically different languages.

Relations Among Environmental Factors, Behavioural Factors, Emergent Literacy Skills, and Reading Skills

Chapter III of this dissertation is a paper published in *Scientific Studies of Reading* (Stephenson, Parrila, Georgiou, & Kirby, 2008). Whereas the focus of the first study is on the effects of one environmental factor on language, emergent literacy, and reading skills, in the second study the effects of several environmental and motivational factors on emergent literacy and reading skills are simultaneously examined. The three questions examined include: (a) Are home literacy, parents' beliefs and expectations, and children's task-focused behaviour uniquely associated with better emergent literacy skills in Kindergarten? (b) Are home literacy, parents' beliefs and expectations, and children's task-focused behaviour uniquely associated with better word reading accuracy in Kindergarten

and Grade 1? and (c) Are home literacy, parents' beliefs and expectations, and children's task-focused behaviour indirectly associated with word reading in Grade 1 via the emergent literacy skills?

In Chapter III the term *emergent literacy skills* refers to letter knowledge and phonological sensitivity, which is a more narrow definition than is commonly used. Letter knowledge is defined as children's ability to give the name and sound of each letter in the English alphabet. Phonological sensitivity is a sensitivity to the sound structure of a spoken language and the ability to segment speech into sublexical units such as syllables, onsets and rimes, or phonemes (Bruck, 1993). Throughout Chapter III *home literacy* refers to shared book reading (defined as an adult reading a book to a child at home), parent teaching activities (defined as an adult teaching a child letter names, sounds, and how to read words), and reading environment (defined as the quantity of adult and children's books in the home). In Chapter III *environmental factors* refers to the home literacy and parent beliefs and expectations and *behavioural factors* refers to children's task-focused behaviour.

The research reviewed in the introduction section of Chapter III suggests that parents' direct teaching predicts unique variance in letter knowledge (e.g., Evans et al., 2000; Sénéchal & LeFevre, 2002) and children's task-focused behaviour predicts phonological sensitivity (Salonen, Lepola, & Niemi, 1998). Parents' beliefs have been shown to predict word reading but the effects of parents' beliefs on emergent literacy skills have not been examined. The first goal of Chapter III is to determine which of the environmental and behavioural factors

uniquely predict emergent literacy skills when they are all included in the same study. The results showed that parents' beliefs about their child's current reading ability predicted phonological sensitivity skills and both direct teaching activities and task-focused behaviour predicted children's letter knowledge skills.

The second question concerns the effects of these environmental and behavioural factors on children's word reading accuracy in Kindergarten and Grade 1. The literature reviewed in Chapter III suggests that parents' beliefs predict word reading in Kindergarten (Galper, Wigfield, & Seefeldt, 1997) but not in Grade1 after controlling for task-focused behaviour (Aunola et al., 2002). The results indicated that both parents' beliefs about their child's current reading ability and task-focused behaviour predicted word reading in Kindergarten, but only task-focused behaviour predicted word reading in Grade 1.

The last question addressed in Chapter III examines whether the environmental and behavioural factors are indirectly associated with Grade 1 word reading via the kindergarten emergent literacy skills. Aunola et al.'s (2002) and Dally's (2006) studies suggest that task-focused behaviour is directly associated with Grade 1 word reading skills even after controlling for the Kindergarten emergent literacy skills. The results reported in Chapter III replicated Aunola et al. and Dally's findings. Task-focused behaviour directly and indirectly predicted significant unique variance in Grade 1 word reading whereas parents' beliefs were indirectly associated with Grade 1 word reading.

Cross Linguistic Predictors of Reading Skills in Grade 3

In the second study of this dissertation the effects of several environmental and motivational factors on emergent literacy and reading skills in Kindergarten and Grade 1 are simultaneously examined. Manolitsis, Georgiou, Stephenson, and Parrila (2009) examined how the effects of these same environmental and motivational factors on emergent literacy and reading skills varied as a function of orthographic consistency. Chapter IV of this dissertation is a follow-up study to study two and to Manolitsis et al.'s study by examining the longitudinal effects of shared-book reading, parents' teaching activities and children's task-focused behaviour on reading and spelling achievement in Grade 3 in children speaking an orthographically inconsistent language (English) and in children speaking an orthographically consistent language (Greek). The study presented in Chapter IV adds to the existing literature by first reassessing the same English and Greek-speaking children on their word reading fluency, reading comprehension, and spelling performance in Grade 3 and, second, by examining how orthographic consistency and task demand affect the relationships between the environmental and behaviour factors and reading and spelling outcome measures.

Chapter IV's introduction begins with a discussion of how orthographically consistent (e.g. Greek) and inconsistent languages (e.g. English) differ in terms of reading and spelling acquisition. The case is made that learning to read an orthographically consistent language is a less demanding task than learning to read an orthographically inconsistent language (e.g., Aro & Wimmer, 2003; Ellis et al., 2004; Seymour, Aro, & Erskine, 2003), and that the difficulty of

the literacy learning task may also vary within a particular language (Georgiou, Manolitsis, Nurmi, & Parrila, 2010). For example, the Greek orthography is much more consistent from graphemes to phonemes than English but less so from phonemes to graphemes. Therefore, one cannot assume that the predictors of reading in an orthographically consistent language will necessarily be the same as predictors of reading in an orthographically inconsistent language, or that the predictors within a language will be the same for differing literacy tasks (e.g., word reading versus spelling). In general, I assumed that task-focused behaviour and environmental factors would become more important the more demanding the literacy task. Thus, task-focused behaviour and environmental factors should play a more important role in orthographically inconsistent languages than they do in orthographically consistent languages and have a stronger effect on spelling followed by reading comprehension and lastly reading fluency.

Manolitsis et al. (2009) is the only study that has examined the role of orthographic consistency on the relationships between environmental and behavioural factors on reading, and Georgiou et al. (2010) is the only paper that has examined how task demand affects these relationships but only for a Greek speaking sample. Georgiou et al. argued that research similar to theirs would be important in orthographically inconsistent languages, such as English, because all languages include more and less demanding features that children need to learn. Thus, the purpose of the present study was to examine the role of task-focused behaviour and environmental factors on spelling, reading comprehension, and reading fluency in Grade 3 in English- and Greek-speaking samples, and to

determine the effects of orthographic consistency and task demand on these relationships.

Because Manolitsis et al. (2009) provided a recent review of studies examining the effect of environmental and behavioural factors on emergent literacy skills and early reading acquisition, Chapter IV's introduction focuses on additional research on the effects of home literacy practices and motivational factors on later reading and spelling skills. Generally the research suggests that there are no direct effects of home literacy on reading and spelling skills beyond Grade 1 (e.g., Hood, Conlon, & Andrews, 2008; Sénéchal & LeFevre, 2002). In contrast, studies examining the effects of task-focused behaviour on reading and spelling beyond Grade 1 have found significant associations (e.g., Georgiou et al., 2010; Hagtvet, 2000; Manolitsis et al. 2009). The first goal of the study presented in Chapter IV was to determine which of the home literacy and behavioural factors uniquely or jointly predict reading and spelling in Grade 3 for an English- and a Greek-speaking sample. The results replicated previous findings that home literacy factors did not directly predict reading or spelling skills. Similar to Georgiou et al.'s (2010) findings the current results indicate that task-focused behaviour directly predicted spelling for the Greek-speaking sample, but not for the English-speaking sample after letter knowledge was controlled for.

The second major goal was to examine the effects of orthographic consistency and task demand on the relationships between home literacy, task-focused behaviour, letter knowledge, vocabulary, and Grade 3 reading and spelling. In terms of orthographic consistency, the current findings indicated that

vocabulary was more important for reading and spelling in English than in Greek. This is in line with a recent study by Nation and Cocksey (2009) in which the relationship between vocabulary and reading words aloud was stronger when words contained irregular spelling-sound correspondences. It also makes sense that vocabulary knowledge would be more important when spelling in English than in Greek because fewer words in English can be spelled purely based on phoneme-grapheme correspondences without knowledge of what the word means. Letter knowledge was more important for spelling in Greek and passage comprehension in English and task-focused behaviour was similarly important across languages for all tasks. In terms of task demand, task-focused behaviour was more important for spelling and passage comprehension in both languages, which is consistent with Georgiou et al.'s (2010) argument that spelling and passage comprehension are more demanding tasks than word reading no matter what the orthographic consistency because they require more effort for an extended period of time.

Chapter V concludes the dissertation with a discussion of the main findings and limitations of the presented studies. Educational implications and some ideas for future research are also presented in Chapter V.

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II. EFFECTS OF SHARED BOOK READING ON LANGUAGE, EMERGENT LITERACY, AND READING ACHIEVEMENT REVISITED: AN UPDATED META-ANALYSIS

Researchers agree that individual differences in literacy skills remain relatively stable throughout elementary grades (e.g., Parrila, Aunola, Leskinen, Nurmi, & Kirby, 2005; see also Scarborough, 1998 for a review of older studies). Less is known about the environmental sources of individual differences. One environmental source of individual differences that has been examined is the home literacy environment and its relations with language development, emergent literacy skills, and reading achievement (e.g., Sénéchal, LeFevre, Hudson, & Lawson, 1996; Sénéchal, LeFevre, Thomas, & Daley, 1998). The main focus of this work has been on parent-preschooler shared book reading as a context that promotes literacy (e.g., Bus, van IJzendoorn, & Pellegrini, 1995; Dickinson & DeTemple, 1998; Scarborough & Dobrich, 1994; Sénéchal, Eleanor, & Monker, 1995; Whitehurst, Arnold, Epstein, Angell, Smith, & Fischel, 1994). This review provides a meta-analysis of recent studies that examine the effect of shared book reading on children's language, emergent literacy, and reading achievement skills.

Fifteen years ago the authors of a review (Scarborough & Dobrich, 1994) and a meta-analysis (Bus et al., 1995) of parent-preschooler shared book reading studies concluded that, overall, parent-preschooler shared book reading explains about eight percent of variance in a combined measure of language, emergent literacy, and reading achievement. Examination of language, emergent literacy, and reading achievement separately, however, resulted in different conclusions

being drawn by the two studies. Bus et al. (1995) concluded that shared book reading was more strongly associated with language development, whereas Scarborough and Dobrich (1994) concluded that shared book reading was equally associated with emergent literacy skills, reading achievement, and language content knowledge, but not with language structure knowledge (syntactic and phonological abilities). Furthermore, Bus et al. concluded that shared book reading is very important, whereas Scarborough and Dobrich raised doubts about its unique importance for reading acquisition. The importance of shared book reading was further questioned by other researchers (e.g., Burgess, Hecht, & Lonigan, 2002) who suggested that the associations found by Bus et al. and Scarborough and Dobrich between children's literacy development and shared book reading were small to modest in size.

Lonigan (1994) and Dunning, Manson, and Stewart (1994), however, suggested that there is some reason to be more optimistic about the effects of reading to preschoolers. Lonigan (1994) argued that many of the studies included in the Scarborough and Dobrich's (1994) review suffer from severe methodological or statistical problems, which limit the validity of their conclusions. The studies used in Bus et al.'s (1995) meta-analysis were virtually identical to those included in Scarborough and Dobrich's review and therefore Lonigan's arguments could apply to Bus et al.'s conclusions as well. The methodological issues Lonigan pointed out included: fairly small sample sizes for the majority of studies (median N =41 for 31 samples for which correlation results for the frequency of reading are reported), inappropriate data analytic

methods given sample sizes (for factor analyses subject-to-variable ratios never exceeded 5:1), nonrepresentative populations, and unsatisfactory ways shared reading and outcome variables were measured (e.g., reading frequency measures with restricted range and nonstandardized outcome measures). Lonigan further made the case that parent-preschooler shared book reading is likely related to some language, emergent literacy, and reading achievement skills, but not all skills within each domain. Thus, the observed effects in Scarborough and Dobrich's (1994) and Bus et al.'s (1995) studies were likely underestimated since both studies examined research that typically evaluated the whole spectrum of language and literacy skills as a single entity.

Dunning et al. (1994) and Scarborough and Dobrich (1994) also indicated that the modest effect sizes found should be interpreted with caution because the measurements of shared book reading frequency used in the studies had been less than ideal. For example, Scarborough and Dobrich suggested that dichotomous or limited ordinal scaling of reading frequency could have failed to capture the full variability in some of the samples (e.g., Durkin, 1966; Scarborough, Dobrich, & Hager, 1991; Share, Jorm, Maclean, & Matthews, 1984; Walker & Kueberitz, 1979). Dunning et al., in turn, suggested that parent questionnaire and individual interview responses have several potential problems: incomplete responses, the likelihood that in many homes the shared book reading is irregular in both duration and incidence and consequently difficult for parents to remember accurately, and uncertainty of the meaning of questionnaire multiple choice responses that use terms such as "frequently" and "seldom".

Studies conducted since 1994 have addressed many of the methodological criticisms by treating the spectrum of language, emergent literacy, and reading skills as separate entities (e.g., Bennett, Weigel, & Martin, 2002; Evans, Shaw, & Bell, 2000; de Jong & Leseman, 2001). Furthermore the often criticized self-report reading frequency measures have been supplemented with print exposure measures. Print exposure measures, such as the author recognition checklist (Stanovich & West, 1989) and the title recognition task (Cunnigham & Stanovich, 1990), may offer a more reliable and valid way of assessing shared book reading in the home because they are less likely to be subject to social desirability bias and do not require parents to interpret the meaning of questions about storybook reading (Sénéchal et al., 1996). For example, if parents perceive reading to their children as socially desirable, then parents' questionnaire responses can reflect this perception as well as actual shared book reading. However, print exposure measures include made up authors or book titles as foils to prevent parents from guessing, and thus presumably reflect more accurately parents' familiarity with children's books. In several studies print exposure measures have been found to be better predictors of children's language skills (Foy & Mann, 2003; Frijters, Barron, & Brunello, 2000; Sénéchal et al., 1996), phonological awareness (Foy & Mann, 2003), word recognition, and reading comprehension (Stanovich & West, 1989) than traditional self-report measures. In other studies, however, print exposure measures have not been found to be better predictors of letter knowledge (Foy & Mann, 2003; Frijters et al., 2000), phonological awareness (Aram & Levin, 2002; Frijters et al., 2000), or word identification and decoding (Aram &

Levin, 2002) compared to traditional self-report measures. Thus, it appears that recent research has started to address some of the methodological flaws suggested by Lonigan (1994), Dunning et al. (1994), and Scarborough and Dobrich (1994), but whether they are the causes of the small effects found in the 1994 review and 1995 meta-analysis of shared book reading to preschoolers still remains unclear.

The objectives of the present article were to conduct a meta-analysis of the articles published since 1994 in order to determine: (a) the relationship between shared book reading and language, emergent literacy, and reading achievement; (b) whether shared book reading is related to some aspects of language, emergent literacy, and reading achievement, but not to others; and (c) whether different predictors—methodological quality of the study, sample size, socioeconomic status, type of shared book reading measure, age of child at time of outcome measure, or publication year—explain any variance in the relationships between shared book reading and language, emergent literacy, and reading achievement. In line with Lonigan (1994) and Dunning et al. (1994), it was expected that more reliable shared book reading measures and more specific measures of language, emergent literacy, and reading skills used in newer studies would result: (a) in slightly higher overall effect size and, (b) in substantial variation between measures in each domain.

Method

Database

For the initial pool of articles the major databases in the field of education and psychology — ERIC, ProQuest Education Journals, PsychInfo — were searched.

The following search terms were used: *shared book reading, joint book reading, storybook exposure, and home literacy environment.* The search was limited to articles between 1994 and 2008, and to preschool years (between 2 and 5 years of age). Second, articles were located by searching the references of the collected articles and relevant books (e.g., van Kleeck, 2003). Third, an author-by-author search was conducted; that is, the authors of the collected articles were used as search terms to find additional articles.

Articles were only included if they were published in English, there was a measure of parent-child shared book reading, and at least one literacy or language outcome measure. The measure of parent-child shared book reading had to be taken prior to the child beginning formal reading instruction in Grade one. Articles were excluded if the statistical indicators of the relationship between parent-child shared book reading and literacy were not provided. Unpublished papers and dissertations were not included. Twenty-five articles with pertinent data were found. Within these 25 articles there were 23 individual samples. The studies are listed in Table 2-1.

Outcome Measures

Consistent with Bus et al.'s (1995) meta-analysis, the outcome measures were divided into three domains: language, emergent literacy, and reading achievement. Language measures included receptive and expressive vocabulary. Emergent literacy measures included letter knowledge, phonological awareness, listening comprehension, print concepts, writing skills, naming speed, nonword repetition, and orthographic awareness. Lastly, reading achievement measures

included word identification, decoding, and reading comprehension. I hoped to examine spelling as well but only three studies included a measure of spelling and the measures were different. For example, one study examined invented spelling whereas another study examined spelling rate.

The effect of shared book reading on each of the three domains was examined separately. In those instances when only a single skill score was provided within a domain (e.g., letter knowledge in the emergent literacy domain) that score was used to reflect the overall domain performance. In contrast, when multiple skill scores under the same domain were reported in a single study, the overall domain score for that study was derived by averaging the effect size of each skill within the domain. The effect of shared book reading on specific skills within the language, emergent literacy, and reading achievement domains was also examined.

For the language domain, the effects of shared book reading on receptive and expressive vocabulary were examined separately. For the emergent literacy domain, the effects of shared book reading on letter knowledge, phonological awareness, listening comprehension, print concepts, and naming speed, nonword repetition, and orthographic awareness were examined separately. For the reading achievement domain, the effects of shared book reading on word identification and decoding were examined separately. When a study had more than one effect size for a single skill (either the same measure taken at different times or different measures of the same skill taken at the same time), the effect sizes were averaged to get a single effect size.

Meta-Analytic Procedures

In the present meta-analysis, the statistical tests reported in original studies were transformed into Cohen's *d* effect size. According to Cohen (1988) effect sizes can be interpreted as $d = 0.20$ is small, $d = 0.50$ is medium, and $d = 0.80$ is a large effect. In order to prevent small samples from dominating the outcome, weighted effect sizes that were based on sample sizes were used. The influence of sample size on the effect sizes was also determined by using sample size as a predictor variable. A fixed-effect model was used to compute within- and between-levels statistics. The analyses were performed using MetaWin Statistical Software for Meta-Analysis, Version 2.0 (Rosenberg, Adams, & Gurevitch, 2000).

Predictors

Methodological quality. The internal and external validity of each study was assessed to determine whether the methodological quality of the studies was associated with variability in effect sizes. The internal validity criteria and their definitions are shown in Appendix A1. The external validity criteria and their definitions are shown in Appendix A2. The criteria are based on Macmillan (2002) and Thompson, Diamond, McWilliam, Snyder, and Snyder (2005). The weighting was similar to the weighting used by Macmillan (2002). In cases where failure to satisfy a criterion was undesirable but unlikely to compromise either the internal or external validity of the study, weighting factor of 1 was assigned. Where failure to satisfy an internal validity criterion placed the conclusions drawn in doubt, a weighting factor of 2 was given. Those criteria regarded as imperative

for eliminating rival interpretations and for permitting generalization of findings to other populations or contexts were allocated a weighting factor of 3. Not all of the criteria applied to each study and therefore the internal validity, external validity, and the overall validity of each study was calculated as a percentage of the criteria applicable to the study. The studies were compared across criteria and the estimate of overall validity, internal validity, and external validity of each study was used in the meta-analysis as predictor variables to try to explain any variation in effect sizes.

The articles were read and coded separately by two graduate students. Inter-rater reliably was calculated by determining the percentage of agreement for each of the criteria (i.e., agreements divided by agreements plus disagreements). Agreement for the criteria ranged from .62 for collinearity to 1.0 for ten of the criteria. The overall inter-rater reliability was calculated by averaging the percentage for each of the criteria. The overall inter-rater reliability was .91. When the raters disagreed on a coding there was a discussion regarding the discrepancy. If the discrepancy could not be resolved I made the final decision regarding the coding.

Sample size. Sample size was based on the number of participants who were used to calculate the correlation between shared book reading and the outcome measures. The sample sizes ranged from 29 to 295.

Socioeconomic status. Socioeconomic status (SES) was divided into two categories: low and middle. Three studies were missing data on SES, and one study had both low and high SES. In total, nine studies were categorized as low

SES and 11 studies were categorized as middle SES. Two studies had samples labeled low middle SES and were categorized as low SES and three studies had samples categorized as upper middle SES so they were categorized as middle SES.

Shared book reading. Some of the studies report book reading frequency as part of a composite measure that includes other components of a home literacy environment (e.g., number of children's books). Bus et al. (1995) argued that it is plausible that parents who read frequently to their children are also likely to read more themselves, have more books (including children's books) in the home, take their young children to the library, and so on. Consistent with this, Bus et al. (1995) found that studies using composite measures showed similar results compared to studies that used a direct measure of reading frequency (e.g., a single frequency question). Thus, these types of studies were included in the present meta-analysis and analyzed together and categorized as questionnaire measures. In addition, there are now studies that include checklists of children and adult book titles or authors as measures of shared book reading. Since it is argued that checklists may offer a more reliable and valid way of assessing shared book reading at home (Sénéchal et al., 1996) I examined whether the measure of shared book reading—questionnaire or checklist—is associated with the effect sizes.

Age at time outcome measure assessed. Similar to Bus et al.'s (1995) study, age of the child at the time the outcome measures were assessed was used. Fifteen of the 24 samples measured shared book reading at approximately the same time the outcome measures were assessed.

Publication year. Publication year was treated as a predictor variable, as it was found to significantly affect the effect sizes in Bus et al.'s (1995) study.

Results

Overall Effect Size

The number of studies, sample size, effect sizes, and confidence intervals for the weighted effect sizes for each domain and specific skill within the domain are summarized in Table 2-2. The effect sizes (*d*) for the association between shared book reading and the literacy-language measures ranged from *d* = -0.52 (Foy & Mann, 2003) to *d* = 1.71 (Sénéchal, LeFevre, Hudson, & Lawson, 1996). The mean effect size for all the outcome measures combined was 0.54; 95% confidence interval (CI) = .47, .61 (23 samples, total *N* = 2039), which is comparable to a mean correlation of *r* = .26.

Domain Effect Sizes

Next, the effect sizes for overall language, overall emergent literacy, and overall reading achievement were examined. The combined effect size for the studies examining shared book reading and language skills was *d* = 0.76; 95% CI = .67, .84 (mean *r* = .35; *N* = 1674). The studies on shared book reading and emergent literacy yielded a combined effect size of *d* = 0.57; 95% CI = .50, .64 (mean *r* = .28; *N* = 1383). The combined effect size for the studies examining shared book reading and reading achievement was *d* = 0.63; 95% CI = .52, .73 (mean *r* = .30; *N* = 918). Thus, the effect size derived for the language measures was larger than the effect sizes for the emergent literacy and reading measures,

however, the difference in effects sizes only appears to be reliable for language and emergent literacy measures, as their confidence intervals do not overlap.

Specific Skill Effect Sizes

Lastly, the effects of shared book reading on the specific skills within language, emergent literacy, and reading achievement were examined. The effect sizes for the specific skills that made up the language domain were reliably different as their confidence intervals did not overlap. Specifically, the effect size for studies examining shared book reading and receptive vocabulary was $d = 0.76$; 95% CI = .69, .83 (mean $r = .35$; $N = 1558$). The studies on shared book reading and expressive vocabulary yielded an effect size of $d = 0.56$; 95% CI = .46, .66 (mean $r = .27$; $N = 609$).

Within the emergent literacy domain the effect sizes of the specific skills seemed to be divided into two groups. The effect sizes for shared book reading and listening comprehension ($d = 0.40$; 95% CI = .30, .50; mean $r = .20$; N = 250), and shared book reading and phonological awareness ($d = 0.35$; 95% CI = .26, .44; mean $r = .17$; N = 645) were below $d = 0.50$. Reliably larger effect sizes were found for shared book reading and print concepts ($d = 0.52$; 95% CI = .50, .54; mean $r = .25$; N = 186) and shared book reading and letter knowledge ($d = 0.57$; 95% CI = .51, .63; mean $r = .28$; N = 880). Naming speed, nonword repetition, name and age writing, word writing-recognition, and orthographic awareness tasks were included in the overall emergent literacy domain but not examined as specific skills because the effects of shared book reading on these skills was only examined in single studies.

The specific skills that made up the reading achievement domain included word identification, decoding, and reading comprehension. The effect size for shared book reading and word identification was $d = 0.75$; 95% CI =.66, .84 (mean $r = .35$; $N = 625$) whereas the effect size for shared book reading and decoding was $d = 0.62$; 95% CI = .61, .63 (mean $r = .30$; $N = 291$). The effect size for shared book reading and reading comprehension was $d = 0.60$; 95% CI = .57, .63 (mean $r = .29$; $N = 142$), however, there were only two studies that examined reading comprehension separately. Studies that combined reading achievement tasks (e.g., reading comprehension and word identification) were only included in the overall reading achievement effect size.

Explaining Variability in the Effect Sizes

Tables 2-3 and 2-4 summarize the correlations between effect sizes and predictor variables. Note that due to small number of studies for many comparisons power was low. Sample size and age of the children when the outcome variables were measured appear to explain some of the variability in the set of studies on shared book reading and reading achievement, although the correlations only approached significance. The larger the sample size and the older the child was when the reading achievement outcome measures were taken the larger the reading effect size. Publication year explained significant variability in the set of studies on shared book reading and reading achievement and approached significance for studies on shared book reading and language. More recent studies have found smaller effect sizes for shared book reading and reading achievement and for shared book reading and language. The contrast between

studies with low SES families and middle SES families was significant only for the emergent literacy domain. Samples with middle SES families had higher emergent literacy effect sizes than samples with low SES families. For methodological quality, because there were only nine studies with reading outcomes, the statistical power is low and therefore some large correlations are not statistically significant. For the methodological quality, the overall validity, internal validity, and external validity correlated -.38, -.32, and -.42, respectively, with the reading effect sizes. This suggests that generally the better the methodological quality score the lower the reading effect sizes.

Table 2-4 presents the comparison between the type of shared book reading measure, either questionnaire or checklist, and the different effect sizes. Only the confidence intervals for reading achievement do not overlap. This suggests that compared to questionnaires, checklists produced a reliably smaller effect size. It should be noted that there were only two studies that compared shared book reading and reading achievement using checklists.

Discussion

The first objective of the current paper was to conduct a meta-analysis of the papers published since Bus et al.'s (1995) and Scarborough and Dobrich's (1994) reviews to determine whether the associations between shared book reading and language, emergent literacy, and reading achievement would be larger given that supposedly better measures of shared book reading are now being used.

Comparable to findings from Bus et al.'s meta-analysis, the current analysis found that the overall effect of shared book reading on all of the literacy-language

measures combined was $d = 0.54$. Thus, consistent with Bus et al.'s and Scarborough and Dobrich's overall conclusion, shared book reading explained about 7% of the variance in all of the literacy-language measures combined. Inconsistent with Bus et al.'s conclusions but similar to Scarborough and Dobrich's conclusions, the results indicate that overall shared book reading was more strongly associated with the language domain than the emergent literacy domain or the reading domain, although the latter difference was not reliable. The effect size of shared book reading and emergent literacy skills ($d = 0.57$) found in the present study is very similar to the effect size reported in Bus et al.'s study for shared book reading and emergent literacy skills ($d = 0.58$). The effect sizes for shared book reading and language and shared book reading and reading achievement skills ($d = 0.76$, $d = 0.63$, respectively) found in the present study were larger than those reported in Bus et al.'s study ($d = 0.67$, $d = 0.55$, respectively). It is likely that the present meta-analysis is a better indicator of the true effect of shared book reading and language skills as the combined sample size for the language measures in the present study is 1674 compared to 958 in Bus et al.'s meta-analysis. In contrast, Bus et al.'s meta-analysis may be a better indicator of the true effect of shared book reading and reading achievement as their combined sample size for reading measures was 2248 compared to 918 in the present meta-analysis.

An examination of the factors that may explain variability in the effect sizes further revealed that the type of measure used to assess shared book reading only made a difference for reading achievement outcomes. Publication year explained

significant variability in the reading effect sizes and approached significance for the language effect sizes. More recent studies produced smaller language and reading achievement effect sizes. This is partly consistent with Bus et al.'s findings that publication year explained significant variability in all of the effect sizes. In terms of emergent literacy measures the lack of statistical power in the present study is the likely reason for the discrepancy between our findings and to Bus et al.'s, as publication year and emergent literacy effect sizes correlated -.31. Similar to Bus et al.'s study, socioeconomic status did not significantly influence any of the domain effect sizes.

Bus et al. found that sample size and age of the child when their reading achievement was measured impacted the effect sizes, but the present study did not find that sample size or age of the child when outcome measures were taken significantly explained any variability in the domain effect sizes. Again, the lack of statistical power is the likely reason for the discrepancy in findings.

The present study also examined methodological quality of the paper as a variable that may explain variability in the effect sizes. The methodological quality, whether it was based on the internal validity criteria, external validity criteria, or the overall validity criteria, did not significantly explain variability in the effect sizes. This may have been due to the lack of statistical power, as some of correlations were relatively large. Although methodological quality did not significantly explain variability in the effect sizes, it correlated significantly with publication year ($r = .42$, $p < 0.5$). The more recently the article was published, the better the methodological quality. Further, as stated above, the more recently

the study was published the smaller the effect sizes found for language and reading achievement. Thus, the idea that improving the methodological flaws of the papers published prior to 1994 might result in larger effects sizes (e.g., Dunning et al. 1994; Lonigan 1994; Scarborough & Dobrich, 1994) was not supported by the present findings.

The second objective of the present meta-analysis was to determine whether shared book reading is related to some aspects of language, emergent literacy, and reading achievement but not to others. Of the language skills measured, both skills had moderate effect sizes according to Cohen's (1977) criteria but shared book reading appears to be reliably more related to receptive than to expressive vocabulary. This finding could reflect the nature of the shared book reading activity, or that there are studies (e.g., Griffin & Morrison, 1997; Leseman & de Jong, 1998; Sénéchal, 2006) that measured receptive vocabulary skills when students were six years of age or older, but no studies that measured expressive vocabulary in students who were six years of age or older. It is possible that it takes longer for shared book reading to affect expressive vocabulary, something that future studies will have to establish.

In contrast, the effect of shared book reading on the specific emergent literacy skills seems to vary. For example, shared book reading is more strongly related to print concepts and letter knowledge than to listening comprehension and phonological awareness. This is consistent with van Kleeck's (2003) and Whitehurst and Lonigan's (1998) suggestion that there is growing evidence that shared book reading is often not predictive of phonological processing, however,

it is not consistent with van Kleeck's suggestion that shared book reading is often not predictive of alphabet knowledge. One possible reason is that parents who read to their children may also teach their children letter names and sounds. For example, Stephenson et al. (2008) showed that 90% of parents who reported that their children were frequently taught letter names, sounds, or to read words also reported that their children were read to at least once a day. Thus, direct teaching of letter knowledge and shared book reading may explain similar variance in letter knowledge, but this could not be controlled for in the present study. This is in contrast with previous findings that letter activities and shared book reading are unrelated (Evans et al., 2000; Sénéchal et al., 1998). It is possible that the nature of shared book reading over the recent years is starting to change to include more direct teaching approaches.

Of the reading skills, shared book reading was more strongly associated with word identification than with decoding or reading comprehension. One possible explanation is that in order to decode, a child has to have phonological awareness and letter knowledge skills and only letter knowledge seems to be moderately related to shared book reading. Word identification, on the other hand, may have more to do with the child's familiarity with words, which may come from print exposure. It is surprising that shared book reading did not have a stronger effect on reading comprehension, because vocabulary, which is more strongly related to shared book reading, has been shown in some studies (e.g., Sénéchal; 2006; Sénéchal & LeFevre, 2002) to have a direct relationship with reading comprehension skills. One possible explanation for our findings is that

there were only two studies that were used to calculate the reading comprehension effect size. Thus, more studies are needed to have a better estimate of the relationship between shared book reading and reading comprehension, and whether this relationship is mediated by vocabulary as suggested by Sénéchal's (2006) home literacy model. In addition, more studies are needed that examine the relationship between shared book reading and other emergent literacy skills, such as naming speed, nonword repetition, name and age writing, word writing-recognition, and orthographic awareness. The effect of shared book reading on these skills could not be determined due to the scarcity of studies that have examined these skills.

Limitations

One of the major limitations of the present meta-analysis is the number of published studies since 1994 that measure the same specific skills in order to calculate exact effect sizes of shared book reading on specific skills. In order to get a more accurate estimate of the effects of shared book reading on specific skills, one possibility would be to combine the studies from Bus et al.'s (1995) meta-analysis that looked at specific skills with the studies in the current meta-analysis.

A second limitation of the present meta-analysis is that it does not take into consideration whether the effects of shared book reading would be significant after other measures, such as teaching activities, demographics, general ability, and attitudes, are taken into account. For example, Scarborough and Dobrich (1994) suggested that in the studies that permitted such comparisons

demographic, attitudinal, and skill differences among preschoolers all made stronger direct contributions to predictions than shared book reading.

Lastly, the present meta-analysis does not take into consideration how the effects of shared book reading may differ for opaque versus transparent orthographies. For example, in a cross-linguistic study conducted by Manolitsis, Georgiou, Stephenson, and Parrila (in press) shared book reading was significantly related to letter knowledge for the English-speaking sample but not for the Greek-speaking sample. More cross linguistic studies are necessary in order to determine whether shared book reading has the same effect on language, emergent literacy, and reading skills in different orthographies.

Conclusion

Schatschneider, Fletcher, Francis, Carlson, and Foorman (2004) suggest that the best predictive model of grade one reading achievement included kindergarten children's letter knowledge, phonological awareness, and naming speed (see also Bishop, 2003; Parrila, Kirby, & McQuarrie, 2004). Scarborough (1998) also suggested that children's letter name knowledge in kindergarten is as predictive of future reading as a more traditional comprehensive readiness battery. The present meta-analysis, however, found that shared book reading had only a very small effect on phonological awareness and only a moderate effect on letter knowledge. Thus, based on the current findings making statements regarding the appropriate practices for promoting literacy, such as "the single most important activity for building these understandings and skills essential for reading success appears to be reading aloud to children" (IRA & NAEYC, 1998, p.198), appear

premature and clearly more research needs to be conducted to determine what makes a difference in measures that are most predictive of reading achievement. That is not to say that reading aloud to children is not a good thing. It just might not be enough on its own to make a difference in their reading achievement.

Table 2-1

Study Characteristics

Author (Year)	*N* and SES	Validity -overall -internal -external	Age shared book reading assessed	Age outcome assessed	Frequency measure	Outcome measure	Statistic 1.	Statistic 2.	*d* 1.	*d* 2.
Aram & Levin	41	-0.66	69.59	Same[b]	1.	Word writing/recognition	1. *r*=.47		1. 1.06	
(2002)	Low	-0.74	months		Questionnaire	Phonological awareness	*r*=.38		0.82	
		-0.22	(2.14)[a]			Orthographic awareness	*r*=.54		1.28	
					2.CTC[c]	Word writing/recognition	2. *r*=.52		2. 1.22	
						Phonological awareness	*r*=.39		0.85	
						Orthographic awareness	*r*=.49		1.12	
					3.CTC Child	Word writing/recognition	3. *r*=.34		3. 0.72	
					answer	Phonological awareness	*r*=.35		0.75	
						Orthographic awareness	*r*=.39		0.85	
Dickinson &	1. 65	-0.23	1. 3.90	5.60 years	Questionnaire	Story comprehension	*r*=.36	*r*=.25	0.77	0.52
DeTemple	2. 47	-0.20	years			Definition task	*r*=.48	*r*=.40	1.09	0.87
(1998)	Low	-0.56	2. 4.80			PPVT-R	*r*=.49	*r*=.38	1.12	0.82
			years			Emergent literacy	*r*=.47	*r*=.28	1.06	0.58
				End Gr.[d] 1		Word identification	*r*=.31	*r*=.44	0.65	0.98
Evans, Shaw, &	67	-0.58	5.11 years	Same	CTC	Letter sounds	*r*=.20		0.41	
Bell (2000)	Middle	-0.62	(3.77			Letter names	*r*=.27		0.56	
		-0.44	months)			TOPA-K[e] phonological	*r*=.17		0.34	
			May – K[f]			PPVT-R[g]	*r*=.21		0.43	
Leseman & de	89	-0.38	4.30 years	4.30 years	Questionnaire	Receptive vocabulary	*r*=.46		1.04	
Jong (1998)		-0.51	5.30 years	7.00 years		Receptive vocabulary	*r*=.30		0.63	
Full Sample		-0.22	6.30 years			Decoding	*r*=.35		0.75	
						Reading comprehension	*r*=.28		0.58	
de Jong &	64	-0.46	4.30 years	7.00 years	Questionnaire	Listen comprehension	*r*=.03		0.06	
Leseman (2001)		-0.47	5.30 years	9.20 years		Decoding	*r*=.22		0.45	
		-0.44	6.30 years			Reading comprehension	*r*=.19		0.39	

(continues)

Table 2-1 (continued)

Author (Year)	*N* and SES	Validity -overall -internal -external	Age shared book reading assessed	Age outcome assessed	Frequency Measure	Outcome measure	Statistic Reported		*d*	
							1.	2.	1.	2.
Foy & Mann (2003)	40 Middle	-0.46 -0.44 -0.57	4.86 (0.67) years	Same	1. Questionnaire 2. CTC and CAC[h]	Phonological awareness	*r*=-.25	*r*=.05	-0.52	0.10
						Rhyme awareness	*r*=-.01	*r*=.14	-0.02	0.28
						Nonword Repetition	*r*=.21	*r*=.22	0.43	0.45
						Naming Speed	*r*=-.17	*r*=.14	-0.34	0.28
						Expressive vocabulary	*r*=-.12	*r*=.06	-0.24	0.12
						Letter names and sounds	*r*=.13	*r*=.07	0.26	0.14
						Word id & word attack	*r*=-.16	*r*=-.05	-0.32	-0.10
Frijters, Barron, & Brunello (2000)	92	-0.60 -0.52 -1.00	68.50 (3.50) months	Same	1. Frequency Parent	Letter knowledge[i]	1. *r*=.31		1. 0.65	
						PPVT-R	*r*=.24		0.49	
						Phonological awareness	*r*=.38		0.82	
					2. Frequency Caregiver	Letter knowledge	2. *r*=.09		2. 0.18	
						PPVT-R	*r*=.13		0.26	
						Phonological awareness	*r*=.11		0.22	
					3. CTC	Letter knowledge	3. *r*=.34		3. 0.72	
						PPVT-R	*r*=.39		0.85	
						Phonological awareness	*r*=.24		0.49	
					4. Books[j]	Letter knowledge	4. *r*=.18		4. 0.37	
						PPVT-R	*r*=.43		0.95	
						Phonological awareness	*r*=.20		0.41	
Gest, Freeman, Domitrovich, & Welsh (2004)	76 Low to Middle	-0.63 -0.77 -0.00	62.0 (3.98) months	Same	1. Frequency 2. CAC and CTC	Receptive and expressive language	*r*= .41	*r*=.51	0.90	1.18
						Decoding	*r*= .28	*r*=.25	0.58	0.52
Griffin & Morrison (1997)	295	-0.56 -0.59 -0.44	5.50 years (Fall K)	1. 5.50 years 2. Spring Gr. 2	Questionnaire	PPVT-R	*r*=.63		1.62	
						Letter and word reading	*r*=.42		0.92	
						PPVT-R	*r*=.55		1.32	
						Word reading	*r*=.49		1.12	
Christian, Morrison, & Bryant (1998)	295	-0.55 -0.54 -0.57	5.50 years	Same	Questionnaire	Letter names	*r*=.45		1.01	

(continues)

Table 2-1 (continued)

Author (Year)	*N* and SES	Validity -overall -internal -external	Age shared book reading assessed	Age outcome assessed	Frequency measure	Outcome measure	Statistic Reported		*d*	
							1.	2.	1.	2.
Hood, Conlon, & Andrews (2008)	143 Low to Middle 123 105	-0.73 -0.77 -1.00	5.36 (0.29) years	1. Same 2. 5.95 (0.30) years 3. 7.02 (0.29) years	Questionnaire and CTC	Decoding & letter names Phonological awareness Decoding & letter names Phonological awareness Reading Rate Spelling Rate Decoding & letter names Phonological awareness Reading rate Spelling rate	1. *r*=.17 *r*=.14 2. *r*=.04 *r*=.11 *r*=.08 *r*=.12 3. *r*=-.03 *r*=.02 *r*=-.02 *r*=-.03		1. 0.34 0.28 2. 0.08 0.22 0.16 0.24 3. - 0.06 0.04 - 0.04 - 0.06	
Korat, Klein, & Segal-Drori (2007)	90 High (46) & Low (44)	-0.49 -0.41 -0.78	71.08 (4.54) months	Same	Questionnaire, CTC and ATC[l]	Emergent literacy Composite[k]	*r*= .41		0.90	
Molfese, Modglin, & Molfese (2003)	113 Low	-0.42 -0.32 -0.78	Within one month of 3rd birthday	1. 8.00 years 2. 9.00 years 3. 10.00 years	Questionnaire HOME[m] (only Reading and Language items)	School-administered reading achievement Word identification Word attack School-administered reading achievement Word identification Word attack Word identification Word attack	1. *r*= .30 *r*= .42 *r*= .34 2. *r*= .36 *r*= .35 *r*= .33 3. *r*=. 31 *r*= .27		1. 0.63 0.92 0.72 2. 0.77 0.75 0.70 3. 0.65 0.56	

(continues)

Table 2-1 (continued)

Author (Year)	*N* and SES	Validity -overall -internal -external	Age shared book reading assessed	Age outcome assessed	Frequency measure	Outcome measure	Statistic 1.	Statistic 2.	*d* 1.	*d* 2.
Payne, Whitehurst, & Angell (1994)	236 Low	-0.43 -0.39 -0.57	53.50 months	Same	1. Frequency	PPVT-R	1. *r*=.23		1. 0.47	
						EOWPVT[n]	*r*=.27		0.56	
					2. Frequency	PPVT-R	2. *r*=.08		2. 0.16	
						EOWPVT	*r*=.21		0.43	
					3 Books	PPVT-R	3. *r*=.30		3. 0.63	
						EOWPVT	*r*=.25		0.52	
Roberts, Jurgens, & Burchinal (2005)	72 Low	-0.44 -0.41 -0.56	Average of 18.00, 30.00, & 42.00 months	Begin K	1. Frequency 2. HOME	PPVT-R	*r*=.21	*r*=.46	0.43	1.04
						Receptive language[o]	*r*=.13	*r*=.31	0.26	0.65
						Expressive language[o]	*r*=.24	*r*=.39	0.49	0.84
						TERA[p]	*r*=.15	*r*=.43	0.30	0.95
Sénéchal (2006)	90 Middle	-0.68 -0.75 -0.44	6.00 years (3.00 months)	1. 6.00 years	Frequency and Books	Receptive vocabulary	1. *r*=.20		1. 0.41	
						Letter knowledge	*r*=.08		0.16	
						Phonological awareness	*r*=.02		0.04	
	65			2. 7.10 years		Reading	2. *r*=.10		2. 0.20	
						Spelling	*r*=.05		0.10	
						Phonological awareness	*r*=.13		0.26	
	65			3. 10.00 years		Reading comprehension	3. *r*=.34		3.0.72	
						Fluency	*r*=.12		0.24	
						Spelling	*r*=.05		0.10	
Sénéchal, Eleanor, & Monker (1995)	32 Middle	-0.26 -0.27 -0.22	45.50 (4.00) months	Same	Frequency	PPVT-R	*r*=.39		0.85	
	44 Upper-Middle	-0.31 -0.34 -0.22	36.50 (4.50) months	Same	Frequency	PPVT-R	*r*=.40		0.87	

(continues)

Table 2-1 (continued)

Author (Year)	*N* and SES	Validity -overall -internal -external	Age shared book reading assessed	Age outcome assessed	Frequency measure	Outcome measure	Statistic Reported		*d*	
							1.	2.	1.	2.
Sénéchal, LeFevre, Hudson, & Lawson (1996)	117 Middle	-0.54 -0.50 -0.71	4.40 years Range = 3.40 - 5.90	Same	1. CTC 2. CAC 3. Frequency 4. Books	PPVT-R PPVT-R PPVT-R PPVT-R	*r*=.40 *r*=.44 *r*=.24 *r*=.34		0 87 0.98 0.49 0.72	
	47 Middle	-0.67 -0.70 -0.44	4.10 years Range = 2.90 -5.10	Same	1. BERT[q] title 2. BERT-character 3. BERT-story 4. CTC 5. CAC 6. Frequency 7. Books	1.PPVT-R 2.EOWPVT-R[r]	*r*=.52 *r*=.40 *r*=.20 *r*=.41 *r*=.43 *r*=.10 *r*=.37	*r*=.65 *r*=.58 *r*=.33 *r*=.33 *r*=.50 *r*=.27 *r*=.20	1.22 0.87 0.41 0.90 0.95 0.20 0.80	1.71 1.42 0.70 0.70 1.15 0.56 0.41
Sénéchal, LeFevre, Thomas, & Daley (1998) (sample continued)	110 Middle & Upper - Middle	-0.70 -0.72 -0.57	Begin of K	First half of school year K- 60 (6.5) months	CTC and CAC	PPVT-RListening comprehension Phonological awareness Print concepts Letter knowledge Invented spelling Decoding	*r*=.44 *r*=.26 *r*=.32 *r*=.27 *r*=.25 *r*=.32 *r*=.29		0.98 0.54 0.68 0.56 0.52 0.68 0.61	

(continues)

Table 2-1 Continued

Author (Year)	*N* and SES	Validity -overall -internal -external	Age shared book reading assessed	Age outcome assessed	Frequency measure	Outcome measure	Statistic Reported 1.	Statistic Reported 2.	*d* 1.	*d* 2.
(continued sample) Sénéchal & LeFevre (2002)	93 Middle & Upper - Middle	-0.80 -0.84 -0.67		1. Begin Grade 1	CTC and CAC	PPVT-R Listening comprehension Phonological awareness Print concepts Letter knowledge Invented spelling Decoding	1. *r*=.38 *r*=.31 *r*=.10 *r*=.17 *r*=.08 *r*=.27 *r*=.27		0.82 0.65 0.20 0.34 0.16 0.56 0.56	
	93			2. End Gr. 1		Word identification & comprehension	2. *r*=.22		2. 0.45	
	66			3.End Gr. 3		Word identification & comprehension	3. *r*=.32		3. 0.68	
Sonnenschein & Munsterman (2002)	29 Low	-0.26 -0.15 -0.56	Spring K	Same	Frequency	Phonological awareness Print orientation[s] Story comprehension	*r*=.37 *r*=.52 *r*=-.02		0.80 1.22 -0.04	
Stephenson, Parrila, Georgiou, & Kirby (2008)	61 Middle	-0.84 -0.84 -0.78	66.84 (3.88) months	Same Spring 1	1. Books[t] 2. Frequency	PPVT-III[u] Phonological awareness Letter knowledge Word id (decoding) Word id and fluency	*r*=-.01 *r*=.14 *r*=.21 *r*=-.02 *r*=.09	*r*=.18 *r*=.16 *r*=.38 *r*=.28 *r*=.05	-0.02 0.28 0.43 -0.04 0.18	0.37 0.32 0.82 0.58 0.10
Weigel, Martin, & Bennett (2006)	85 Middle to Upper - Middle	-0.57 -0.54 -0.67	49.7 (6.80) months	1. 49.7 (6.80) months 2. 1 year later	Questionnaire	Print knowledge[v] Emergent write[v] Expressive language[w] Receptive language[w] Print knowledge[v] Emergent write[v] Expressive language Receptive language	1. *r*=.26 *r*=.20 *r*=.17 *r*=.21 2. *r*=.31 *r*=.02 *r*=.19 *r*=.18		1. 0.54 0.41 0.34 0.42 2. 0.65 0.04 0.39 0.37	
Whitehurst, Arnold, Epstein, Angell, Smith, & Fischel (1994)	73 Low	-0.67 -0.67 -0.67	3.46 (0.39) years	Same	Books	PPVT-R EOWPVT ITPA[x] Our word expressive test devised for study	*r*=.11 *r*=.35 *r*=.26 *r*=.25		0.22 0.75 0.54 0.52	

[a]Standard Deviation in brackets
[b]Outcome measures were assessed at the same as age the child was read to was assessed
[c]Children's Book Title Checklist completed by an adult
[d]Grade
[e]Test of Phonological Awareness Kindergarten Version
[f]Kindergarten
[g]Peabody Picture Vocabulary Test Revised
[h]Children's Author Recognition Checklist
[i]Letter names and sounds
[j] Nujmber of children's book
[k]Concepts of print, Word recognition (not decoding), Phonological awareness, Letter knowledge (name or sound)
[l] Home Observation for Measurement of the Environment
[m]Adult Book Title Checklist
[n] Expressive One Word Picture Vocabulary Test
[o]Clinical Evaluation of Language Fundamentals - Preschool
[p]Test of Early Reading Ability
[q]Book Exposure Recall Test
[r]Expressive One Word Picture Vocabulary Test Revised
[s]Includes letter name knowledge
[t]Number of Adult and children books
[u]Peabody Picture Vocabulary Test Third Edition
[v]Children's Emergent Literacy Task
[w]Preschool Language Scale - 3
[x]Illinois Test of Psycholinguistic Abilities

Table 2-2

Effect Sizes

Domains and Skills	Number of Studies	Sample Size	Effect Size	Weighted Effect Size	CI[a]
Overall Language-Literacy	23	2038	.57	.54	.47-.61
Overall Vocabulary	18	1674	.67	.76	.67-.84
Receptive Vocabulary	16	1558	.68	.76	.69-.83
Expressive Vocabulary	7	609	.57	.56	.46-.66
Overall Emergent Literacy	16	1383	.50	.57	.50-.64
Listening Comprehension	4	250	.32	.40	.30-.50
Phonological Awareness	9	645	.38	.35	.26-.44
Letter Knowledge	8	880	.44	.57	.51-.63
Print Concepts	2*	186	.52	.52	.50-.54
Overall Reading Achievement	9	918	.46	.63	.52-.73
Decoding	3*	291	.61	.62	.61-.63
Word Identification	5	625	.58	.75	.66-.84
Reading Comprehension	2*	142	.60	.60	.57-.63

[a] Confidence Intervals

Note. It has been suggested that comparisons with less than 4 studies should be interpreted with caution (Mol, Bus, de Jong, & Smeets, 2008).

Table 2-3

Correlations Between the Predictor Variables and Effect Sizes

Predictor	Language	Emergent Literacy	Reading	Publication Year
1. Sample Size	.38	.28	.62†	
N	*18*	*16*	*9*	
2. SES	-.24	-.58**	-.40	
N	*15*	*12*	*7*	
3. Age at Outcome	.14	-.32	.45†	
N	*21*	*21*	*18*	
4a. Overall Validity	-.20	-.23	-.38	.41†
N	*18*	*16*	*9*	*23*
4b. Internal Validity	-.10	-.21	-.32	.32
N	*18*	*16*	*9*	*23*
4c. External Validity	-.44†	-.20	-.42	.31
N	*18*	*16*	*9*	*23*
5. Publication Year	-.41†	-.31	-.74**	
N	*18*	*16*	*9*	

**$p < 0.01$, *$p < 0.05$, †$p < 0.10$.

Table 2-4

Effect Sizes Based on the Type of Measure

Domains and Skills	Number of Studies	Sample Size	Effect Size	Weighted Effect Size	CI[a]
Overall Vocabulary					
Questionnaires	16	1505	.62	.73	.63-.83
Checklist	8	540	.76	.82	.73-.91
Overall Emergent Literacy					
Questionnaires	12	1001	.51	.59	.50-.68
Checklist	6	418	.53	.52	.46-.58
Overall Reading Achievement					
Questionnaires	7	715	.49	.73	.59-.87
Checklist	2	130	.24	.37	.26-.48

[a] Confidence Intervals

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III. EFFECTS OF HOME LITERACY, PARENTS' BELIEFS, AND CHILDREN'S TASK-FOCUSED BEHAVIOUR ON EMERGENT LITERACY AND WORD READING SKILLS

I report a longitudinal study that examined how home literacy (shared book reading, parent teaching activities, and books in the home), children's task-focused behaviour during everyday learning situations, and parents' beliefs in and expectations of their children's reading and academic ability are associated with literacy skill development. Specifically, this paper will focus on two emergent literacy skills–phonological sensitivity and letter knowledge–in kindergarten and word reading in both Kindergarten and Grade 1.

There is substantial evidence that letter-name knowledge and phonological sensitivity are important predictors of early reading achievement (Bishop, 2003; de Jong & van der Leij, 1999; Kirby, Parrila, & Pfeiffer, 2003; Parrila, Kirby, & McQuarrie, 2004; Scarborough, 1998; Schatschneider, Fletcher, Francis, Carlson, & Foorman, 2004; Wagner, Torgesen, & Rashotte, 1994; Wagner et al., 1997; for a review of older studies see Adams, 1990). While extensive, this literature has some significant shortcomings. First, as Whitehurst and Lonigan (1998) pointed out, we know little about the origins of these emergent literacy skills. Several studies have suggested that better reading outcomes are associated with environmental factors, such as shared book reading (e.g., Bus, van IJzendoorn, & Pellegrini, 1995) and parents' beliefs in and expectations of their child's reading and academic ability (e.g., Entwisle & Hayduk, 1988; Galper, Wigfield, & Seefeldt, 1997), and children's task-focused behaviours (e.g., Aunola, Nurmi,

Niemi, Lerkkanen, & Puttonen, 2002; Hagtvet, 2000). Very few studies, however, have examined whether these environmental factors and children's task-focused behaviours significantly affect phonological sensitivity and letter knowledge. Second, most existing studies on reading acquisition have focused either on the emergent literacy skills or environmental factors or children's task-focused behaviour. As a result, there is little understanding of the unique and joint contributions these three sources make to successful reading acquisition. A better understanding of the relationships among different environmental factors, children's task-focused behaviour, and emergent literacy skills is necessary for a more comprehensive theory of reading acquisition to emerge.

Letter knowledge, phonological sensitivity, and naming speed have been shown to be reliable predictors of early reading skills (Bishop, 2003; Schatschneider, Fletcher, Francis, Carlson, & Foorman, 2004). Several recent publications have reviewed the literature on letter knowledge, phonological awareness, and naming speed (e.g., Parrila et al., 2004; Scarborough, 1998; Schatschneider et al., 2004; for a review of older studies, see Adams, 1990). Instead of repeating the review here, I focus on the perhaps less known research examining how environmental factors (home literacy and parents' beliefs and expectations) and children's task-focused behaviour affect reading acquisition and emergent literacy skills.

Home Literacy

Shared book reading, or storybook exposure, is likely the most studied aspect of home literacy. Earlier studies have reported mixed results in terms of its

significance as a predictor of emergent literacy skills (see e.g., Bus et al., 1995; Scarborough & Dobrich, 1994, for reviews). Lonigan (1994) argued that many of the earlier studies of shared book reading suffered from methodological problems that limit the validity of their conclusions. According to Lonigan, preschool storybook exposure is likely to be related to some aspects of language, emergent literacy, and reading achievement, but not to others. Whitehurst and Lonigan (1998) further criticized studies on storybook exposure and reading achievement for including only a single measure of home literacy (e.g., frequency of storybook reading) and a single measure of emergent literacy outcome (e.g., preschool language use).

Several recent studies have included more than one home literacy factor and more than one emergent literacy skill. These studies have indicated that children's storybook exposure may be associated with better vocabulary and listening comprehension skills (Frijters, Barron, & Brunello, 2000; Sénéchal & LeFevre, 2002), but not with better phonological sensitivity, letter-name knowledge, or letter-sound knowledge (Evans, Shaw, & Bell, 2000; Frijters, Barron, & Brunello, 2000) or with better reading skills in Grades 1 and 3 (Sénéchal & LeFevre, 2002). In contrast, informal teaching activities (e.g., teaching reading, letters, or printing) taking place at home were significantly associated with better written-language skills (Sénéchal & LeFevre, 2002) and with better letter-name and letter-sound knowledge (Evans et al., 2000), but not with better phonological sensitivity (Evans et al., 2000). Similarly, Kirby and Hogan (2008) found that being taught to recognize letters and read words before

Kindergarten discriminated between good (top 40%) and poor (bottom 40%) readers in Grade 1 better than amount of shared book reading and number of books in the home.

Finally, interventions aimed to make shared book reading sessions more beneficial have improved children's general language skills but not more specific skills. For example, Lonigan and Whitehurst (1998) found that improving parent-child interactions during reading sessions produced changes in preschool children's general language skills but not in their phonological sensitivity. Justice and Ezell (2002), in turn, trained parents to engage in more print referencing behaviours (verbal and nonverbal cues to encourage children's attention to and interactions with print) during shared book reading, and found that after controlling for children's expressive vocabulary, children's print awareness and knowledge of print and book conventions, but not their alphabet knowledge, improved. In sum, the above studies suggest that shared book reading can have an effect on general language skills but more specific activities, such as teaching letter names, letter sounds, or printing, may be necessary to directly impact letter knowledge and reading skills. Phonological sensitivity, in turn, seems to be relatively independent of these aspects of the home literacy.

Parents' Beliefs and Expectations

Earlier research suggested that parents' beliefs and expectations could play an important role in children's school performance (Murphey, 1992; Sigel, 1985). More specifically, parents' positive beliefs about their children's cognitive (e.g., Crandall, Dewey, Katkovsky, & Preston, 1964; Stevenson, Parker,

Wilkinson, Hegion, & Fish, 1976) or academic (e.g., Galper et al., 1997; Entwisle & Hayduk, 1988) ability have been shown to be associated with children's high achievement in reading.

Recent studies, however, suggest that these effects may be limited. Once previous reading level is controlled, parents' beliefs no longer predict future reading performance (Aunola et al., 2002; Gill & Reynolds, 1999; Halle, Krutz-Costes, & Mahoney, 1997). These results question the direction of impact – it is possible that parents' beliefs reflect the observed earlier reading skills rather than that later reading skills reflect parents' earlier beliefs. Another possible explanation for the difference in findings is the inconsistency in the age of the children when parents fill out questionnaires regarding their beliefs and expectations. Entwisle and Hayduk (1978) argued that after Grades 1 and 2, the impact of parents' beliefs decreases relative to the strong impact of the child's previous reading skills. Most of the studies have focused on older school-age children (e.g., Crandall et al., 1964; Entwisle & Hayduk, 1988; Halle et al., 1997; Stevenson et al., 1976) and only a few studies have considered children who are just beginning their formal education (e.g., Aunola et al., 2002).

In addition, it is possible that the impact of parents' beliefs is indirect. Aunola et al. (2002) showed that parents' beliefs in their children's general academic competence predicted children's task-focused behaviour, which then predicted growth in reading achievement. This outcome raises the possibility that, although not directly important for achievement, parents' beliefs may influence

children's task-focused behaviour, which may be linked to better academic outcomes.

Task-Focused Behaviour

Research has generally indicated that positive motivational and behavioural styles, such as mastery beliefs, task-focused behaviours, and active coping efforts, are associated with better academic outcomes and that helplessness beliefs, passivity, fear of failure, and task-irrelevant behaviours are associated with poorer academic outcomes (e.g., Butkowsky & Willows, 1980; Galloway, Leo, Rogers, & Armstrong, 1995; Mantzicopoulos, 1990; Midgley, Arunkumar, & Urdan, 1996). Specific to reading, Hagtvet (2000) found that Norwegian children who were poor readers at age 9 scored higher than good readers on a measure of task-avoidant behaviour at the age of 6, before formal reading instruction began, and again at age 9. Similarly, Lepola, Salonen, and Vauras (2000) reported that Finnish children with good decoding skills in Grades 1 and 2 displayed higher task-focused behaviour in Kindergarten than did children with poor decoding skills independently of the level of phonemic sensitivity (see also, Poskiparta, Niemi, Lepola, Ahtola, & Laine, 2003).

One of the first studies (Salonen, Lepola, & Niemi, 1998) to examine the effects of task-focused behaviour on phonological sensitivity found that Finnish children entering Grade 1 who were rated as task-focused by their Kindergarten teachers performed better both in a phonological sensitivity task at the beginning of Grade 1 and in a word reading task at the end of Grade 1. After phonological sensitivity was controlled, however, task orientation did not significantly predict

word reading. In contrast, Lepola, Poskiparta, Laakkonen, and Niemi (2005) reported that Grade 1 fall task orientation mediated the relationship between Kindergarten phonological sensitivity and Grade 1 spring word reading fluency. Furthermore, even after controlling for Grade 1 spring phonological sensitivity and naming speed, task orientation measured two months prior contributed uniquely to the prediction of Grade 1 spring word reading fluency. Similarly, Dally (2006) found that for a sample of English speaking students, Kindergarten task-focused behaviour significantly predicted Grade 1 word reading skills even after controlling for Kindergarten phonological sensitivity, rapid naming, letter knowledge, and word recognition. Finally, Onatsu-Arvilommi and Nurmi (2000) and Aunola et al. (2002) both reported reciprocal effects: Grade 1 students' pre-reading and pre-math skills influenced their task-focused behaviour, which then influenced later reading and math achievement.

With the exception of Dally (2006), all the studies reviewed above have been conducted with children whose language has a very consistent orthography, and whether the results differ for a language with more inconsistent orthography, such as English, is still an open question. In addition, no studies have directly examined the influence of task-focused behaviour on letter knowledge.

Overview of Present Study

The present study examines longitudinally the effects of children's home literacy (direct teaching of literacy skills, reading to child, and number of books in the home), parents' beliefs in and expectations of their children's reading and academic ability, and children's task-focused behaviour, on emergent literacy

skills and word reading. The major question addressed is whether children's task-focused behaviour (as an indicator of motivational predisposition) and the environmental factors are uniquely associated with better emergent literacy skills (phonological sensitivity and letter knowledge) in Kindergarten and better word reading in Kindergarten and Grade 1 after controlling for general cognitive ability. On the basis of the reviewed research, it was hypothesized that parents' direct teaching would predict unique variance in letter knowledge (e.g., Evans et al., 2000; Sénéchal & LeFevre, 2002). It was also expected that parents' beliefs would predict word reading in Kindergarten (Galper et al., 1997) but not in Grade 1 after controlling for task-focused behaviour (Aunola et al., 2002). Finally, it was hypothesized that task-focused behaviour would predict unique variance in Grade 1 word reading even after controlling for the Kindergarten emergent literacy skills (e.g., Aunola et al., 2002; Dally 2006).

Methods

Participants

Children

Letters of information describing the study were sent to parents of all the 223 kindergarten students in six suburban schools in St Albert, Alberta, Canada. One hundred sixty-one students were given parental permission to participate in the study. Of these, 77 (39 males and 38 females) were randomly selected to be part of the present study. There were no students excluded based on linguistic or other grounds, except missing data. Of these 77 students, 16 students had missing data on either some or all of the parent questionnaire data and one student was

missing letter sound data. In order to examine if the performance of the 16 children with missing data differed significantly from the performance of the children with no missing data, *t* tests were performed on the Kindergarten measures. The results showed that the two groups differed significantly only on word identification ($t = 3.84$, $p < .001$). The mean for the children with missing data was .81 ($SD = 1.11$) whereas the mean for the remaining 61 children was 4.98 ($SD = 8.23$). Kindergarten analyses were conducted with the 61 students who had all of the data. Mean age of these 61 students (31 females and 30 males) was 66.84 months ($SD = 3.88$) at the time of the Kindergarten spring testing. Ninety-seven percent of the 61 students were Caucasian, and 50 percent had attended preschool. Whether or not the child attended preschool did not correlate significantly with any of the dependent measures. Of the 61 kindergarten students, three students moved before beginning Grade 1, three students were retained in Kindergarten, and two students were not given permission to continue in the study. Therefore, analyses with the Grade 1 data were conducted on the 53 students who had all of the data.

Parents

Parents of all the Kindergarten children received two questionnaires along with the letters of information and consent forms. Of the 77 children selected to participate in the present study, 10 parents agreed for their children to participate but did not return one or both of the questionnaires, and seven parents did not complete all of the questions. Questions not filled out on the questionnaires were related to the parents' beliefs about their child's current reading ability; several

parents commented that their child was in Kindergarten and therefore was not yet expected to read. Questionnaires for the participating children were filled out by the children's mother (n = 37), father (6), or guardian (13). For 11 participants, the person who filled out the questionnaire was not stated. The modal educational level for mothers and fathers was "completed community college," the minimum was "some high school," and the maximum was "completed graduate school." Parents´ occupation was coded using the Blishen Scale of Socioeconomic Status (Blishen, Carroll, & Moore, 1987) that combines occupational prestige, educational prerequisites, and expected income (income usually associated with specific positions) to a single SES code. In cases where both parents were in the labour force, the higher of the two codes was used rather than the average. Parents who were self-employed, unemployed, or students were coded as missing data. In one family both parents were self-employed and therefore were coded as missing data. The Blishen Scale includes seven classes and the top end, class 7, includes occupations with the highest prestige and education levels (examples from this sample include: lawyer and high school teacher). Eight percent of the current sample fell in class 7, followed by 15% in class 6 (e.g., engineer, helicopter pilot, and social worker), and 42% in class 5 (non-manual occupations with some prestige and requirement of a college diploma or undergraduate degree; e.g., nurse, teacher, and sales manager). Twelve percent of occupations fell within class 4 (non-manual occupations with no particular prestige or education, e.g., millrite, graphic designer, and dental assistant), while the remaining 22% fell in

classes 3 and 2 (19% and 3%, respectively) that include manual occupations (e.g., mechanic, carpenter, paint contractor, and school bus driver).

Teachers

All nine Kindergarten teachers in the six participating schools gave written consent to participate in the study and filled out a questionnaire regarding task-focused behaviour (see below for details) for all 77 selected children. All of the schools were part of the same school division and all of the teachers were female. Point-biserial correlations were calculated to examine whether children's kindergarten teacher correlated significantly with any of the dependent measures. No significant correlations emerged.

Measures

February of Kindergarten

Phonological Sensitivity

Blending was measured with the CTOPP Blending Words task (Wagner et al., 1999), which required the examinee to listen to a series of separate sounds and then put the sounds together to make a whole word. There were 20 test items. Stimuli were modified to Canadian pronunciations. Testing was discontinued after three consecutive errors were made and a participant's score was the number of correct items.

Letter Knowledge

Letter-Name Knowledge was assessed by administering the Letter Identification test (Clay, 1993). Participants were asked to identify each of the

upper and lowercase letters. Two lowercase letters, *a* and *g*, were presented in two different fonts, so the total possible score was 54.

Home Literacy

Home Literacy was assessed with six Likert-scale questions. Parents were asked (1) how often their child was taught to identify letters; (2) how often their child was taught letter sounds; and (3) how often their child was taught to read words when the child was 2 to 4 years of age. In addition, they were asked (4) how often their child is read to at home, (5) how many children's books are in the home, and (6) how many books are in the home. For questions one to four, the six-point Likert-scale ranged from *never* to *more than once a day*. For questions five and six, the Likert-scales ranged from *less than 10* to *more than 200* and *less than 100* to *more than 1000*, respectively. These questions were taken from a questionnaire devised by Kirby and Hogan (2008). In the present study, the two questions about books at home were correlated (r = .63) and so their standardized scores were summed to make a single Books at Home score. Cronbach's alpha coefficient for Books at Home was .75. Similarly, parents' reports of their children being taught letter names, letter sounds, or to read words were correlated (r = .76 for teaching letter names and letter sounds; r = .60 for teaching letter sounds and to read words; r = .35 for teaching letter names and to read words). Question about frequency of reading, however, correlated only moderately (.23, .30, and .28) with teaching letter names, letter sounds, and word reading, respectively. Thus, rather than making a single reading activity score, the standard scores of the three teaching questions were summed together to make a single

variable, Direct Teaching, whereas the reading frequency question was kept separate. Cronbach's alpha coefficient for Direct Teaching was .78. Thus, three different home literacy indicators are reported below: Books at Home, Direct Teaching, and Reading Frequency.

Parents' Beliefs and Expectations

Parents' beliefs about their children's reading ability and school performance were assessed with 8 five-point Likert-scale questions from questionnaires used by Aunola et al. (2002; see Appendix B). The Likert-scale ranged from *not at all well/ very hard* to *very well/ very easily*. Questions addressed parents' beliefs about their child's reading ability and general academic ability and future performance in school.

April / May of Kindergarten

Phonological Sensitivity

Elision was modified from the Comprehensive Test of Phonological Processing (CTOPP) (Wagner, Torgesen, & Rashotte, 1999) by adding six test items, four two-syllable words and two words that required the participant to say the word without saying a designated sound in the word, to make a total of 29 items. Items were recorded digitally with Canadian pronunciations onto a laptop computer and presented through separate speakers. Testing was discontinued after three consecutive errors. A participant's score was the number of correct items.

Letter Knowledge

Letter-Sound Knowledge was assessed by having participants give the sound of each uppercase letter presented in random order on a laptop screen. For

vowel sounds either the long or short sound was acceptable; for consonants that make two sounds either correct sound was acceptable (e.g., /k/ or /s/ were accepted for *c*). Testing was discontinued after six consecutive items were incorrect. Participants' score was the total number correct.

Reading

Word Identification was modified from the Woodcock Reading Mastery Tests-Revised (WRMT-R; Form H; Woodcock, 1987) and used to assess word reading. Words were presented individually on a computer screen and the participant was required to read the isolated words aloud. Testing was discontinued after six consecutive errors.

General Cognitive Ability

Vocabulary was assessed using the Peabody Picture Vocabulary Test-Third Edition (PVTT-IIIA; Dunn & Dunn, 1997). Participants were shown four pictures and the examiner said a word to describe one of the four pictures. The participant was required to point to the correct picture for the word given by the examiner. Items were administered in sets of twelve. Testing was discontinued after eight or more errors within the highest set of items administered. Participants' score was the number of correct items.

Nonverbal Cognitive Ability was assessed using Coloured Progressive Matrices (Sets A, Ab, and B; Raven, 1956). Each set contained 12 items and a participant's score was the total items correct on all three sets.

Task-Focused Behaviour

Kindergarten teachers were asked to evaluate the behaviour of each child using the Behavioural Strategy Rating Scale-II (BSR-II; Aunola, Nurmi, Parrila, & Onatsu-Arvilommi, 2000). Teachers were asked to think of a specific classroom situation and then rate the child's behaviour using seven statements assessed with a five-point Likert-scale that ranged from *very much/easily* to *not at all*. Five questions (see Appendix B) assessed children's use of task-focused versus task-avoidant behaviour.

Two additional questions assessed children's defensiveness. More than half of the participants (55%) received a score of three (middle of the scale) on both questions, indicating problems with the scale. These questions were dropped from further analyses.

April / May of Grade 1

Reading

The same Word Identification task that was used in Kindergarten was also used in Grade 1.

Word Reading Fluency was assessed using the Sight Word Efficiency subtest from the Test of Word Reading Efficiency (TOWRE; Form A; Torgesen, Wagner, & Rashotte, 1999). Testing was discontinued after 45 seconds. Participants' score was the total number of words read correctly.

Procedure

All participants were tested individually in their respective schools during school hours by trained experimenters (two graduate research assistants). Testing was divided into two sessions lasting roughly 20 to 30 minutes. Elision, Color

Naming, Letter Sound Knowledge, and Word Identification were presented with Dell Latitude 800 laptop computer using DirectRT (Empirisoft Corporation, 2000) reaction time software. Sound files for Elision were presented through separate high-quality speakers (Sony SRS-A57).

Results

Descriptive Analyses

Table 3-1 reports the means and standard deviations for all measures. PPVT-III, Raven's Matrices, Blending, and TOWRE were presented to participants in the standardized format. Compared to norm samples, the present sample appears to have relatively high nonverbal IQ and above average vocabulary, but average phonological skills. The Kindergarten Word Identification standard score mean of 97 suggests that compared to the norm sample, in Kindergarten the present samples word reading skills were average. The Grade 1 standard score mean of 110 for Word Identification and 109 for TOWRE suggests that on average our sample was developing word reading skills very well. However, the Word Identification task was not presented in standardized format and thus comparison to norms may be misleading.

To limit the effect of task specific variability, I combined different indicators of phonological processing skills into construct scores. Elision and Blending were highly correlated (r = .74) and their z-scores were summed to make a single variable, Phonological Sensitivity, which was used in all the remaining analyses. Similarly, Letter-Name Knowledge and Letter- Sound Knowledge were highly correlated (r = .70) and the z-scores were summed to

make a single variable, Letter Knowledge, which was used in all the remaining analyses. Letter Knowledge scores were negatively skewed, so they were first reflected (by subtracting the actual score from 3.41) and then log transformed (Tabachnick & Fidell, 1996). The log-transformed reflected scores were used in all correlational analyses. As Letter Knowledge scores used in all correlational analyses were reflected, results were corrected for direction to simplify their interpretation. Analyses were also conducted using Letter-Sound Knowledge and Letter-Name Knowledge separately, and these results are reported only if they were different from the Letter Knowledge analyses. For Word Identification in Kindergarten, 31 participants scored 0 and 24 scored either 1 or 2. No transformation resulted in a normal distribution. All subsequent analyses were calculated both with the raw score and with a categorical score with three classes (0 correct, 1 or 2 correct, and more than 2 correct). The latter results are reported only if they were different from the raw score analyses. Finally, Grade 1 Word Identification and TOWRE were highly correlated (r = .86) and the z-scores were summed to make a single variable, Grade 1 Word Identification, which was used in all the remaining analyses.

The Home Literacy (HL) questionnaire indicated that on average parents in the present study reported having between 100 and 199 children's books at home, which is higher than reported in previous Canadian studies (Frijters et al., 2000; Sénéchal, LeFevre, Thomas, & Daley, 1998). One reason for this may be that the scale used in this study allowed for parents to report more books. Parents reported further that storybook reading occurred in the home about once a day and

that children were taught to read words a few times a month. These numbers are very similar to those found by Frijters et al. (2000) and Sénéchal et al. (1998) in different Canadian samples.

On the parents' beliefs and expectations questionnaire, parents reported that, on average, their child was not currently reading very well but would read well in the future, and that their child was currently doing well in school and would do well in school in the future. Questions relating to parents' beliefs about their children's reading and general academic ability were analyzed separately. For parents' beliefs about their child's reading ability, a factor analysis using principal axis factoring with oblique rotation indicated that a two-factor solution provided a good fit for the data. The two factors correlated .54. Parents' beliefs about how well their child currently reads, how hard their child has to try in reading, and how easy their child finds reading loaded on one factor that explained 65.06% of the variance. The standardized scores for these three questions were summed to form Parents' Beliefs About Their Child's Current Reading (PBCR) variable that was used in all subsequent analyses. Because three cases had missing data on one or two of the three questions that made up the Parents' Beliefs About Their Child's Current Reading variable, a factor score was not used. Missing data were replaced with the same value as their answers to the other questions. Parents' beliefs about how well their children will read in the future (PBFR) loaded on a second factor that explained an additional 7.07% of the variance. Raw scores were used in subsequent analyses.

For parents' beliefs about their children's general academic ability, factor analysis using principal axis factoring indicated that questions about children's current and future academic ability loaded on one factor explaining 58.17% of the variance. The standardized scores for these four questions were summed to form the Parent's Beliefs about Their Child's Academic Ability (PBAA) variable.

Finally, an examination of the distributional properties of the Behavioural Strategy Rating Scale-II indicated that the Task-Focus score was negatively skewed and showed a ceiling effect (about 16% of sample scored 25). Scores were reflected by subtracting the actual score from 26 (Tabachnick & Fidell, 1996). Log transformations were then performed on the reflected scores. The log transformed reflected scores were used in all correlational analyses. As Task-Focus scores used in all correlational analyses were reflected, results were corrected for direction to simplify their interpretation.

Correlations Between the Variables

Table 3-2 presents the correlations between the predictor variables and the dependent variables. The Kindergarten dependent variables were highly correlated with each other and with the Grade 1 word reading task. These results were expected on the basis of existing studies (see e.g., Bishop, 2003; Evans et al., 2000; Kirby et al., 2003; Sénéchal et al., 1998).

Children's age did not correlate significantly with any of the dependent variables, whereas both PPVT-III and Raven's Matrices were significantly correlated with all of them. In general, these correlations were modest and varied from .31 to .46. In terms of the Home Literacy (HL) variables, Direct Teaching

correlated significantly with all of the dependent variables. Frequency of storybook reading correlated significantly with Letter Knowledge and Kindergarten word reading, and the number of books at home did not correlate with any of the dependent variables. Parents' beliefs about their children's general academic ability correlated significantly with all the dependent variables except Grade 1 word reading, and parents' beliefs about their children's current reading ability correlated significantly with all the dependent variables. In contrast, parents' beliefs about their children's future reading ability did not correlate significantly with any of the dependent variables. This latter result may reflect limited variability in parents' beliefs about their children's future reading ability. Finally, Task-Focus was significantly correlated with all the dependent variables.

It should also be noted that the parent belief variables were highly intercorrelated and correlated significantly with both PPVT-III and Raven's Matrices, with the exception that parents' beliefs about their child's future reading did not correlate significantly with Raven's Matrices. Task-Focus also correlated significantly with both PPVT-III and Raven's Matrices. Home Literacy variables, in contrast, did not correlate significantly with any of the control variables. The finding that shared book reading did not correlate significantly with receptive vocabulary is surprising given that there are both theoretical and empirical explanations for this relation (see e.g., Whitehurst & Lonigan, 1998). However, Evans et al. (2000) similarly found that parent teaching activities and shared-book reading did not correlate significantly with vocabulary. One possible explanation for this is that the range for the shared reading variable in our sample was

attenuated, in that nearly all of the children in the sample were read to at least several times per week.

Regression Analyses

Regression analyses were used next to examine the unique contributions of predictor variables to the dependent variables. To simplify the analyses, the three variables – Age, Books at Home, and Parents' Beliefs about their child's Future Reading – that had no significant zero-order correlations with the dependent variables were left out of the regression analyses. Model 1 contained the two remaining control variables, PPVT-III and Raven's Matrices, together with the two Home Literacy variables. Model 2 contained the two control variables together with the two parent belief variables. Next, Task-Focus was entered with the control variables in model 3. Model 4 was estimated only when word reading in Grade 1 was the dependent variable and contained the two control variables and emergent literacy skills (average z scores of phonological sensitivity and letter knowledge).

The independent variables that survived the statistical control of PPVT-III and Raven's Matrices in each one of the three/four initial models were then entered together in a path analyses (Figures 1 to 4). In these path analyses, the two control variables were allowed to correlate with each other but not with the rest of the independent variables, and the independent variables were allowed to correlate with each other.

Phonological Sensitivity

Figure 3-1 shows the results of path analysis with Phonological Sensitivity as the dependent variable and Raven's Matrices, PPVT-III, Parents' Beliefs About Their Child's Current Reading, and Task-Focus as the independent variables. Parents' Beliefs About Their Child's Current Reading and Task-Focus jointly accounted for an additional 4% of the variance after controlling for general ability. Parents' Beliefs About Their Child's Current Reading remained a significant predictor of Phonological Sensitivity but Task-Focus did not. Thus, parents' beliefs about their children's current reading ability was robustly associated with children's phonological sensitivity in this study.

Letter Knowledge

Figure 3-2 shows the results of path analysis with Letter Knowledge as the dependent variable. The significant variables from models 1 to 3 accounted for 21% of additional variance in Letter Knowledge. Of these variables, Direct Teaching and Task-Focus were significant predictors of Letter Knowledge, whereas Parents' Beliefs About Their Child's Current Reading was not. When Letter-Sound Knowledge was used as the dependent variable, the results were essentially the same. When Letter-Name Knowledge was the dependent variable, only Direct Teaching was significant in the final path model; Task-Focus approached significance ($p = .06$). Therefore in the present sample, parents' reports of their children being taught letter names, sounds, and to read words and children's task-focused behaviour were the most robust predictors of children's actual letter knowledge.

Word Identification in Kindergarten

The control variables accounted for 22% of the kindergarten Word Identification variance. Both Parents' Beliefs About Their Child's Current Reading and Task-Focus were significant predictors of Word Identification in their respective initial regression models. When Parents' Beliefs About Their Child's Current Reading and Task-Focus were combined with the control variables in the path analysis (see Figure 3-3), both remained significant predictors of Word Identification and accounted for an additional 11% of the Word Identification variance.

I also examined whether the significant effects of Parents' Beliefs About Their Child's Current Reading and Task-Focus on word identification would remain if the effect of Phonological Sensitivity or Letter Knowledge were controlled. Adding Phonological Sensitivity into the path model in Figure 3-3 resulted in all other predictors being nonsignificant, although Parents' Beliefs About Their Child's Current Reading approached significance (p = .07). When Letter Knowledge was added in the path model, Parents' Beliefs About Their Child's Current Reading remained a significant predictor of Kindergarten word reading but Task-Focus did not.

Word Reading in Grade 1

When Grade 1 Word Reading was used as the dependent variable, the control variables accounted for 28% of the variance. Direct Teaching, Parents' Beliefs about their Child's Current Reading, and Task-Focus were all significant predictors of Word Reading in their respective initial regression models. When

they were combined with the control variables, they jointly accounted for an additional 11% of the variance and Task-Focus remained a significant predictor of Grade 1 Word Reading (Figure 3-4).

Figure 3-5 presents the path model with the emergent literacy skills added as predictors of Grade 1 Word Reading. Task-Focus remained a significant predictor of Word Reading. Of the emergent literacy skills, Kindergarten Letter Knowledge was the strongest predictor of Grade 1 word reading; once its effect was controlled, Phonological Sensitivity did not make a significant contribution. When Letter-Name Knowledge or Letter-Sound Knowledge was used as dependent measures instead of Letter Knowledge, the results were essentially the same and Task-Focus remained a significant predictor.

Direct and Indirect Effects on Word Reading in Grade 1

The above analyses examined only direct effects that home literacy, children's task-focused behaviour, and parent's beliefs have on Grade 1 word reading performance. However, Table 3-2 indicates that the environmental factors and children's task-focused behaviour are themselves significantly correlated and Figures 3-1 and 3-2 both indicate that at least some of them may affect later reading via emergent literacy skills. To obtain estimates of total effects, or the sum of direct (unmediated) and indirect (mediated) effects, the path analysis model displayed in Figure 3-6 was fitted to the data three times, first with Grade 1 word reading composite score (sum of the z scores on Word Identification and TOWRE) as the dependent variable, and then with Grade 1 Word Identification and TOWRE scores as the dependent variables, respectively. The emergent

literacy score was first obtained by summing the highly correlated standardized phonological sensitivity and letter knowledge scores. Raven's Matrices was entered in the models as the more robust control variable.

Table 3-3 shows the standardized estimates of the total effects of Direct Teaching, Parents' Beliefs of Current Reading, Task-Focus, and Raven's Matrices on Grade 1 word reading composite, word reading accuracy (Word Identification) and fluency (TOWRE). These estimates indicate that task-focused behaviour had the highest impact on reading followed by general cognitive ability (as measured by Raven's Matrices). In addition, Direct Teaching appears to have the smallest contribution to the dependent variables. When combined with results presented in Figure 3-5, it can be concluded that much of the effect Direct Teaching, Task-Focus, and parents' beliefs have is mediated by two highly correlated emergent literacy skills, Phonological Sensitivity and Letter Knowledge.

Discussion

The present study examined the effects of multiple environmental and child factors on Kindergarten children's emergent literacy skills and later word reading. Two emergent literacy skills – phonological sensitivity and letter knowledge – were the dependent variables together with Kindergarten and Grade 1 word reading. The environmental factors included three measures of home literacy and three measures of parents' beliefs and expectations. Children's task-focused behaviour was also measured. The major question addressed was whether children's task-focused behaviour and environmental factors are uniquely associated with better emergent literacy and word reading skills in young

children. The results indicated that while many of the environmental factors and children's task-focused behaviour were significantly correlated with the dependent measures, only a few predicted unique variance in the emergent literacy skills and word reading after nonverbal IQ and vocabulary were controlled. After controlling for the emergent literacy skills, only children's task-focused behaviour predicted unique variance in Grade 1 word reading.

Previous studies have reported somewhat mixed findings with regard to storybook exposure and emergent literacy skills (e.g., Bus et al., 1995; Evans et al., 2000; Frijters et al., 2000; Scarborough & Dobrich, 1994). Lonigan (1994) argued that the earlier studies in this area were methodologically flawed because they looked at the general effects of storybook exposure rather than more specific effects. The present study partly addressed Lonigan's critique by examining two specific emergent literacy skills. In the present sample, parents' reports of their children being read to correlate significantly with letter knowledge and Kindergarten word reading. In contrast, parents' reports of their children being directly taught letter names, sounds, and to read words correlated significantly with all of the dependent variables. After controlling for nonverbal IQ and vocabulary knowledge, direct teaching predicted letter knowledge and word reading in Grade 1, although in the case of word reading accuracy in Grade 1, it shared its predictive variance with children's task-focused behaviour. It is not surprising that parents' reports of their children being directly taught letter names, sounds, and to read words did not significantly predict phonological sensitivity since parents were not asked about activities, such as rhyming, which would be

expected to influence phonological sensitivity. Direct teaching also did not significantly predict wording reading. An explanation for this is that parents' beliefs about their children's current reading and children's task-focused behaviours were more highly correlated with the reading measures than direct teaching so once they are accounted for direct teaching does not make a difference. The third home literacy factor, number of books in the home, correlated significantly with parents' reports of their children being taught letter names, sounds, and to read words but not with any of the outcome measures.

These analyses indicate that teaching activities that take place in the home before the child enters Kindergarten are more important for the development of phonological sensitivity, letter knowledge, and word reading than the frequency of storybook exposure or the number of books at home. Our results are in agreement with Sénéchal and LeFevre (2002), who showed that parent teaching of literacy skills predicted significant variance in a combined written-language variable, with Evans et al. (2000) who linked parent teaching with better letter-name and letter-sound knowledge, and with Kirby and Hogan (2008) who found these home teaching activities to discriminate well between more and less able readers. The finding that storybook exposure and the number of books at home are not as important as teaching activities for the development of these emergent literacy skills is not surprising in light of recent eye movement studies showing that when children are read to they spend very little time looking at the print (Evans & Saint-Aubin, 2005; Justice, Skibbe, Canning, & Lankford, 2005).

Although the present results seem to support earlier suggestions that children's storybook exposure may have limited importance as a precursor of the emergent literacy and word reading skills, it should be noted that teaching activities may not be independent of storybook exposure: 90% of parents who reported that their children were frequently taught letter names, sounds, or to read words also reported that their children were read to at least once a day. Thus, it is possible that direct teaching takes place during these reading sessions. Alternately, direct teaching activities may take place outside of shared book reading during other activities such as writing (Aram & Levin, 2002). This latter explanation is perhaps more likely given that our questionnaire asked about teaching activities when the child was aged two to four. Evans, Moretti, Shaw, and Fox (2002) showed that more explicit coaching of letter knowledge and word identification during reading sessions occur from Kindergarten to Grade 1. Ezell and Justice (2000) showed further that little print referencing occurs during shared book reading to preschoolers. Thus, teaching activities are more likely occurring outside of shared book reading.

The nonsignificance of Direct Teaching in the fourth Grade 1 Word Reading model (Figure 3-4) suggests that the effect of teaching activities covaries with children's task-focused behaviour. It is possible that parents' earlier direct teaching activities may have fostered the children's task-focused behaviour, and led to higher levels of emergent literacy skills as well as better word reading. Alternately, more task-focused children could be viewed by their parents as easier to engage or more ready for, and receptive to, literacy instruction in the home. It

is also possible that teachers rated the children with higher skills/ability as more task-focused. Our results suggest that these two latter interpretations are most plausible, given that children's task-focused behaviour was positively correlated with the general cognitive and emergent literacy measures.

Children's task-focused behaviour also predicted unique variance in letter knowledge and word reading in Kindergarten after controlling for nonverbal IQ, vocabulary knowledge, the other significant predictor variables, and in Grade 1 word reading after controlling for the emergent literacy skills. This is consistent with Lepola et al.'s (2005) recent finding that after controlling for phonological sensitivity and rapid naming, children's task-focused behaviour contributed uniquely to the prediction of word reading fluency at the end of Grade 1. It should be noted that Lepola et al. examined whether preschool letter knowledge affect Kindergarten emergent literacy skills and task-focused behaviour but not whether it also influenced Grade 1 reading, which is the finding of the present study.

Hagtvet (2000) argued that we need to take into account a broader spectrum of variables than just emergent literacy skills when trying to prevent reading problems in natural settings. Specifically, she suggested that off-task behaviour should be included in batteries of predictors of reading abilities. Our results support Hagtvet's position. As suggested by Scarborough (1998), letter knowledge may be the best predictor of later word reading skills. However, intervention may also need to focus on changing maladaptive task-avoidant behaviours to improve chances of success.

Previous studies have indicated that emergent literacy skills can predict later task-focused behaviour, which then form a bi-directional relationship with later reading performance (e.g., Aunola et al., 2002; Lepola et al., 2005; Onatsu-Arvilommi & Nurmi, 2000). Salonen et al. (1998) and Lepola et al. (2005) found that task-focused children performed significantly better in phonemic sensitivity; however, unlike the present study, other environmental factors, such as parents' beliefs, were not controlled. Furthermore, these studies did not examine the relationship between task-focused behaviour and other emergent literacy skills, such as letter knowledge. Our results suggest that the cumulative developmental cycle between task-focused behaviour and different literacy and cognitive skills may start much earlier than previously reported.

Finally, parents' beliefs about their children's current reading ability predicted unique variance in phonological sensitivity and word identification in Kindergarten after controlling for nonverbal IQ, vocabulary, and other significant predictor variables. These results are in line with previous studies with Kindergarten children (e.g., Galper et al., 1997). Although parents' beliefs about their child's current reading correlated moderately with letter knowledge so did the other predictor variables and once those variables were controlled, parents' beliefs about their child's current reading was no longer a significant predictor. Thus, parents' beliefs about their child's current reading shared its predictive variance with direct teaching and children's task-focused behaviour. The finding that parents' beliefs did not predict unique variance in Grade 1 reading measures is similar to Aunola et al.'s (2002) results indicating that children's task-focused

behaviour mediated the relationship between parents' beliefs and reading achievement. Based on the present study, however, the direction of the relationship between parents' beliefs about their child's current reading and emergent literacy skills cannot be determined and future studies need to determine whether parents' beliefs and expectations have a causal impact on children's emergent literacy skills.

In general, the environmental factors and children task-focused behaviour explained very little unique variance in the emergent literacy and word reading skills. This may not be surprising if only one fifth of individual variation is due to significant influences from shared environment as suggested by Byrne et al. (2005). It should be noted, however, that one possible explanation for our findings, as well as Byrne et al.'s findings, is the severe restriction of range in the environmental variables due to a slight bias toward higher SES in both studies.

There are some important limitations that should be considered before generalizing the findings of this study. First, the study was carried out with English-speaking children from a community with mainly middle and upper-middle class residents and similar results may not be found for other socioeconomic groups or in different languages. Second, a study covering a longer developmental period would be better suited for examining the possible mediating roles and unique contributions each examined factor has on emergent literacy skills and later reading acquisition. It is possible that some of the environmental factors and task-focused behaviour examined in the current study exerted their influence earlier than when they were measured in this study and

that some other of these variables are influential later in reading development. For example, previous research has shown that shared storybook reading can influence Grade 3 reading comprehension through the child's vocabulary (Sénéchal & LeFevre, 2002). Third, the present study used parents' reports of how often their children are read to. Sénéchal, LeFevre, Hudson, and Lawson (1996) argued that storybook reading is a highly valued activity, and thus parents' responses to a question about the frequency of that activity could be biased (but see Curry, Parrila, Stephenson, Kirby, & Catterson, 2004). It is possible that more direct print exposure measures could have produced different results. Finally, the present study was conducted with Kindergarten and Grade 1 children but the classroom literacy practices were not examined. However, all of the teachers were from one school division following the same curriculum, and it was found that the specific Kindergarten teacher or whether or not children attended preschool did not correlate significantly with any of the outcome measures.

In conclusion, our results lead to two suggestions: that parents should be encourage to actively teach their children letter names, letter sounds, and words; and that intervention research should develop programs that address children's task-focused behaviours as well as emergent literacy skills, and test the impact of the programs on reading skills.

Table 3-1

Means, Standard Deviations, and Reliabilities for Measures at Each Testing Occasion

	N	Mean	SD	Minimum	Maximum	Reliability
Measures-February Kindergarten						
Age (in months)	61	66.84	3.88	58	75	
Blending	61	6.34	2.81	2	13	.89
Letter Name Knowledge	61	39.08	13.29	6	54	.96
Home Literacy Environment						
Number of Children Books [a]	61	4.13	.76	3	5	
Number of Books in Home [b]	61	3.15	1.03	1	5	
Read to Child[c]	61	3.98	.76	2	5	
Teach to Identify Letters[c]	61	3.26	1.22	0	5	
Teach Letter Sounds[c]	61	2.77	1.35	0	5	
Teach to Read Words[c]	60	1.92	1.28	0	5	
Parents' Beliefs and Expectations						.92
How Well Read[d]	58	2.33	1.22	1	5	
Finds Reading Hard/Easy[e]	60	2.66	1.21	1	5	
How Hard Try in Reading[f]	61	2.58	1.12	1	5	
How Well Read in Future[d]				2	5	
Current Academic Ability[d]	61	4.16	.90	1	5	
Finds School Hard/Easy[e]	61	3.82	.99	1	5	
How Hard Try in School[f]	61	3.56	.89	1	5	
Academic Ability in Future[d]	61	4.29	.77	2	5	
Measures-April/May Kindergarten						
Elision	61	7.07	5.03	0	18	.92
Letter Sound Knowledge	61	15.84	8.00	0	26	.94
Word Identification	61	4.98	8.23	0	37	.97
PPVT-III	61	93.43	14.87	61	130	.95
Raven's Matrices	61	19.25	4.45	12	31	.74
Behavioural Styles						
Task-Focus	61	16.43	6.98	5	25	.96

(continues)

Table 3-1 Continued

	N	Mean	SD	Minimum	Maximum	Reliability
Measures- April/May Grade 1						
Word Identification	61	42.53	14.57	8	74	.97
TOWRE	61	37.51	13.64	12	69	.98

Note. [a] 1 = less than 10; 2 = 10-24; 3 = 25-99; 4 = 100-199; 5 = more than 200. [b] 1 = less than 100; 2 = 100-299; 3 = 300-499; 4 = 500-1000; 5 = more than 1000. [c]0 = never; 1 = less than once a month; 2 = a few times a month; 3 = a few times a week; 4 = about once a day; 5 = more than once a day. [d]1 = not at all well; 5 = very well. [e] 1 = very hard; 5 = very easy. [f] 1 = very hard; 5 = not at all hard. TOWRE = Test of Word Reading Efficiency

Table 3-2

Correlations Between Predictor and Outcome Variables

	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.
Control Variables													
1.Age	.37**	.10	-.12	-.07	-.18	-.08	.08	.04	.26*	.13	.16	.06	.03
2.PPVT-III		.41**	.19	.18	-.01	.34**	.38**	.31**	.46**	.38**	.46**	.40**	.42**
3.Raven's Matrices			.21	-.04	.11	.37**	.35**	.23	.31**	.38**	.31*	.39**	.44**
Home Literacy													
4.Direct Teaching				.35**	.39**	.30*	.30*	.21	.31*	.28*	.47**	.35**	.30*
5.Reading Frequency					.08	.14	.19	.16	.28*	.16	.38**	.28*	.05
6.Books at Home						.15	.09	.10	-.00	.14	.21	-.02	.09
Parents' Beliefs													
7.PBAA							.56**	.61**	.54**	.31**	.32*	.39**	.26
8.PBCR								.42**	.49**	.47**	.48**	.54**	.48**
9.PBFR									.37**	.21	.12	.20	.04
Behavioural Styles													
10.Task-Focus										.42**	.55**	.49**	.56*
Emergent Literacy Skills													
11.Phonological Sensitivity											.75**	.70**	.58**
12.Letter Knowledge												.70**	.72**
13. Word Id K													.66**
14. Word Id Gr1													

Note. PBAA = Parents' beliefs about their child's academic ability; PBCR = Parents' beliefs about their child's current reading ability; PBFR = Parents' beliefs about their child's future reading ability; Word ID K = Word Identification in kindergarten; Word Id Gr1 = Word Identification and TOWRE in Grade 1.
*p < .05. **p < .01

Table 3-3

Total Effects of Raven's Matrices, Direct Teaching, Parents' Beliefs on Current Reading, and Task-Focus on Grade 1 Word Reading Accuracy and Efficiency

	Word Reading Composite	Word Identification	TOWRE
Raven's Matrices	.30	.28	.29
Direct Teaching	.11	.11	.10
PBCR	.15	.23	.05
Task-Focus	.36	.32	.38

Note. PBCR = Parents' beliefs about their child's current reading ability.

Figure 3-1. Final model of relations between the predictor variables and Kindergarten phonological sensitivity. * p < .05.

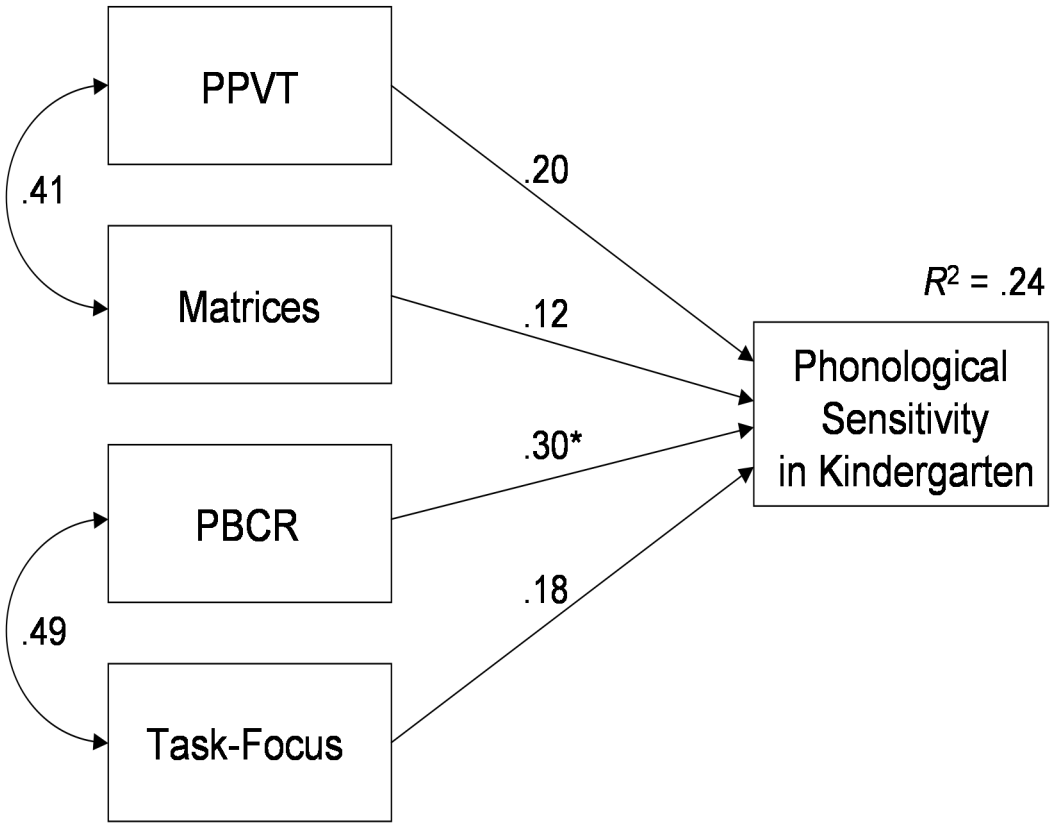


Figure 3-2. Final model of relations between the predictor variables and Kindergarten letter knowledge. * p < .05; ** p < .01.

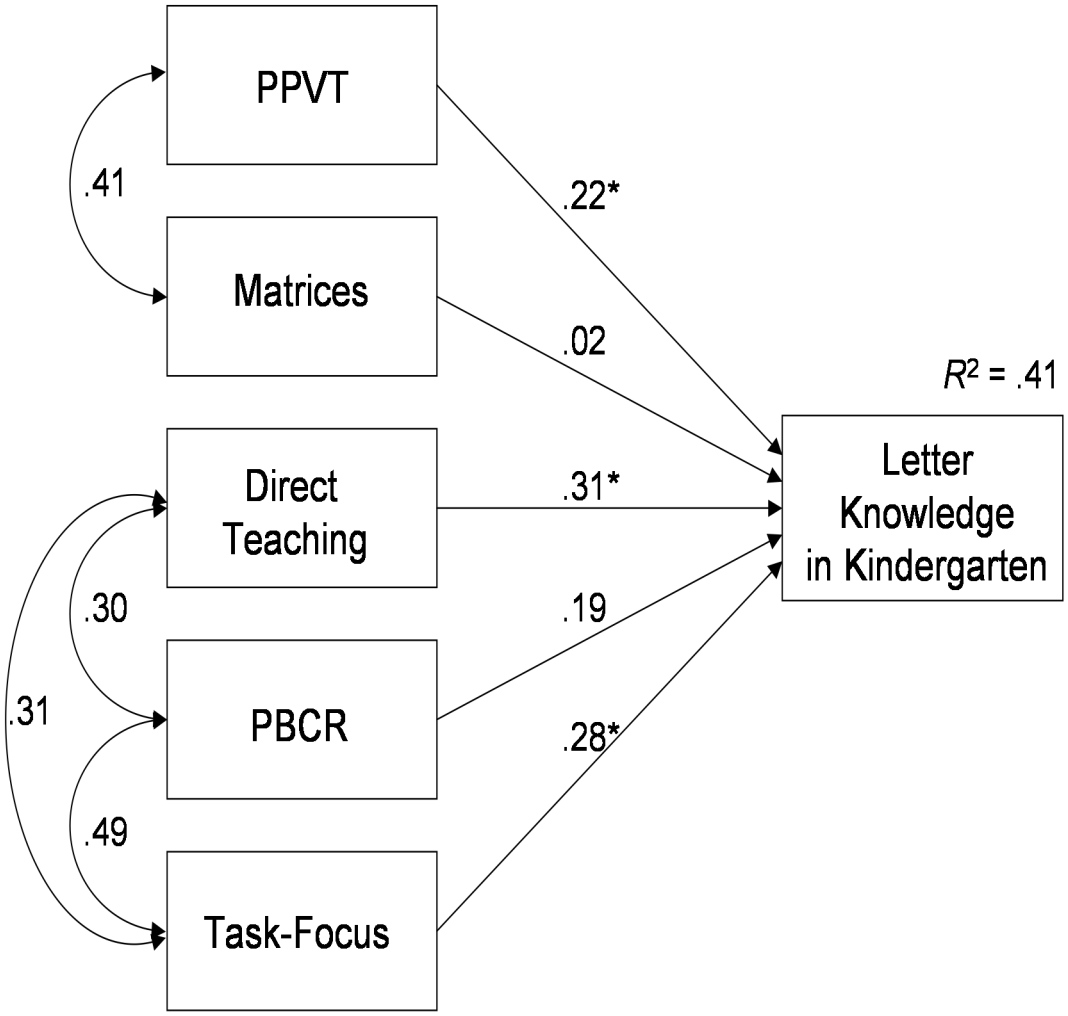


Figure 3-3. Final model of relations between the predictor variables and Word Reading in Kindergarten. ** p < .01.

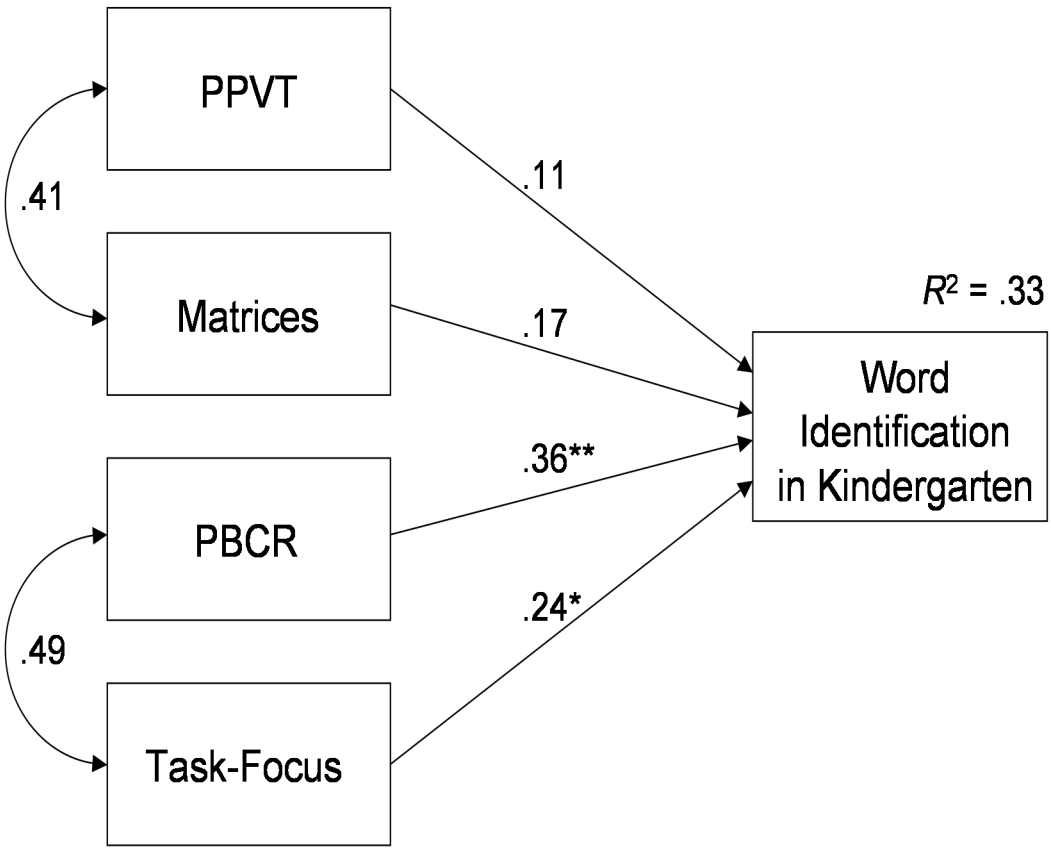


Figure 3-4. Final model of relations between the predictor variables and Word Reading in Grade 1. * p < .05; *** p < .001.

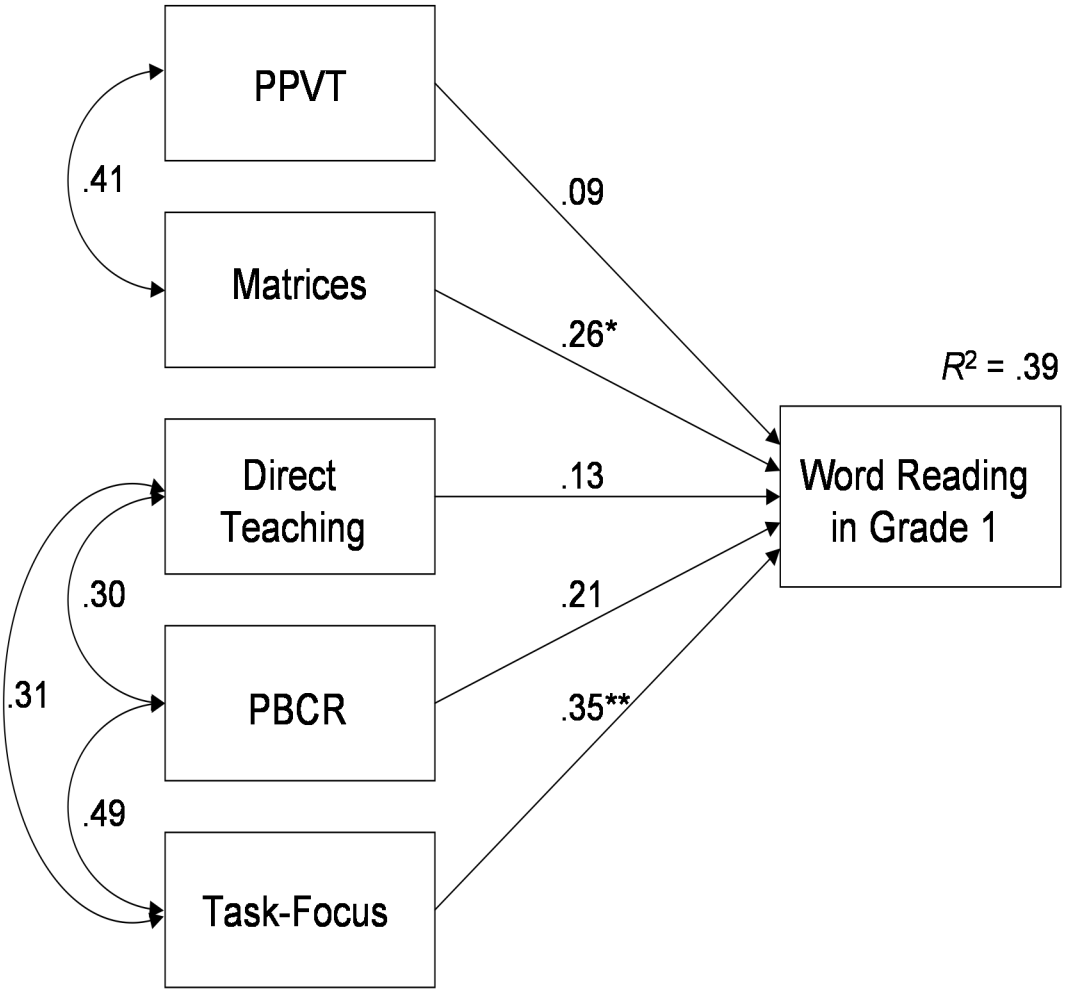


Figure 3-5. The path model of relations between Kindergarten Task-Focus, Phonological Sensitivity, Letter Knowledge, and general ability variables, and Grade 1 Word Reading. * p < .05; *** p < .001.

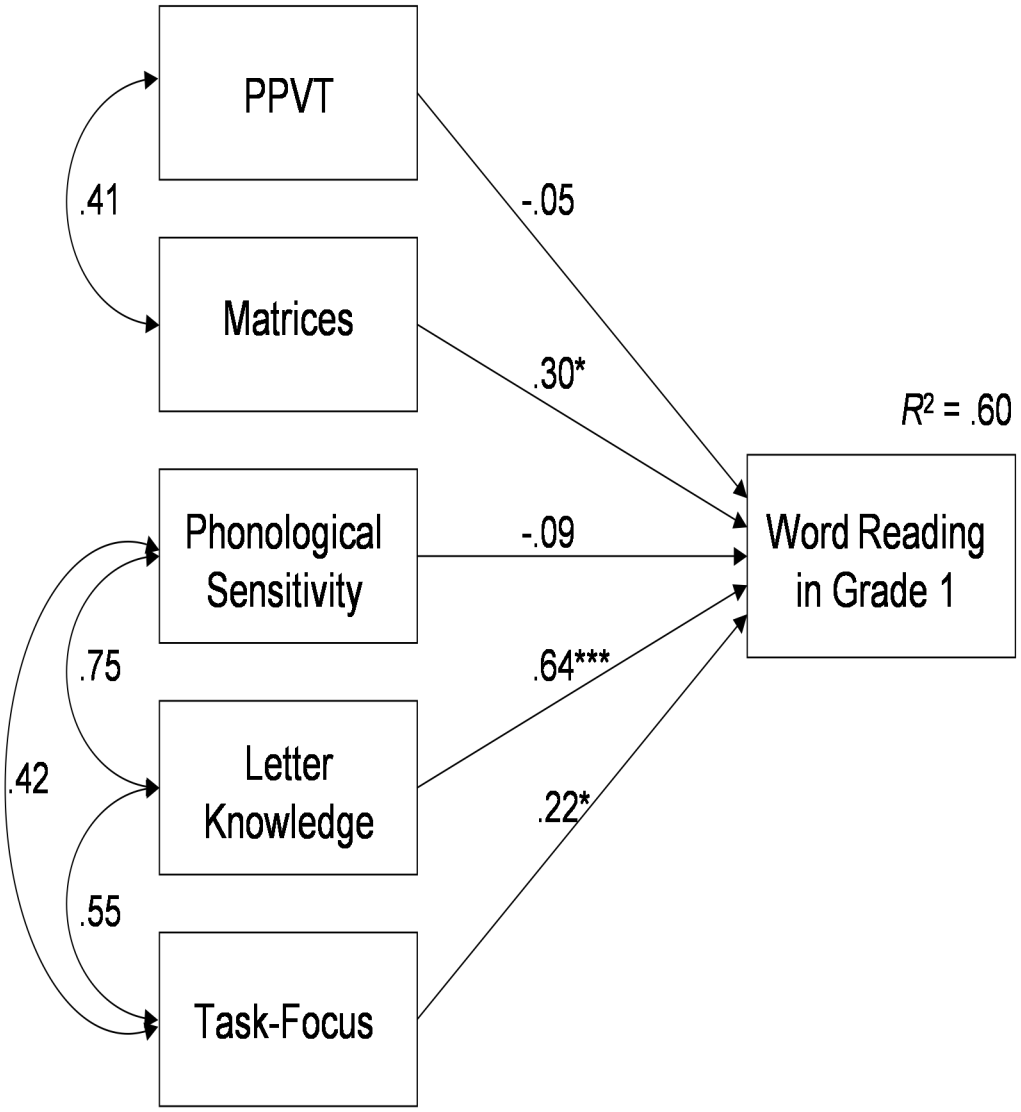
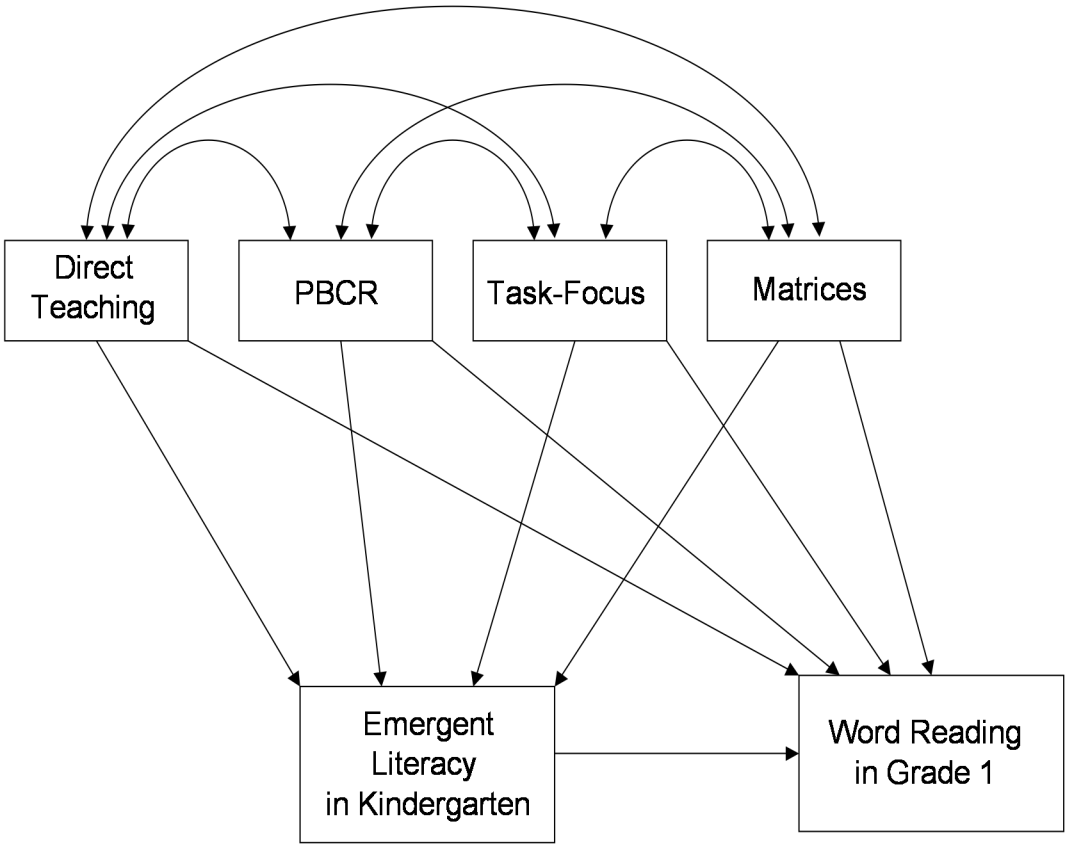


Figure 3-6. The model used to assess total effects (sum of direct and indirect effects) of the predictor variables on Emergent Literacy (Letter Knowledge and Phonological Sensitivity) and Grade 1 Word Reading (Word Identification and TOWRE).



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IV. BEGINNING TO READ AND SPELL ACROSS LANGUAGES VARYING IN ORTHOGRAPHIC CONSISTENCY: COMPARING THE EFFECTS OF ENVIRONMENTAL AND MOTIVATIONAL FACTORS

The current study examines: (a) the unique and joint contributions of letter knowledge, home literacy practices, and child's task-focused behaviours on Grade 3 word reading fluency, reading comprehension, and spelling; and (b) the effect of orthographic consistency and task demands on these relationships. Several studies have shown that home literacy practices, such as shared book reading and parental teaching activities, predict reading achievement (e.g., Bus, van IJzendoorn, & Pellegrini, 1995; Sénéchal 2006). Similarly, motivational factors, such as task-focused behaviour, defined here as positive achievement related behaviour in academic settings, have also been shown to influence reading acquisition (e.g., Aunola, Nurmi, Niemi, Lerkkanen, & Puttonen, 2002; Hagtvet, 2000). By examining in a single study the effects of letter knowledge, home literacy, and motivational factors on reading and spelling skills in two languages varying in orthographic consistency, I address two shortcomings in the current theoretical models of reading: (a) the mainly unchallenged assumption of universality, or to what extent models of reading can be generalized across languages that differ in orthographic consistency (see e.g., Georgiou, Parrila, Papadopoulos, 2008; Manolitsis, Georgiou, Stephenson, & Parrila, 2009; Share, 2008), and, (b) that the models of reading development include only emergent literacy skills, such as phonological sensitivity and letter knowledge, as predictors of reading achievement but exclude the environmental and motivational factors.

Furthermore, approaches that emphasize environmental or motivational factors usually ignore emergent literacy skills.

Orthographic Consistency and Task Demand

Several studies indicate that children learning to read an orthographically consistent language (e.g., Finnish, Italian, German, or Greek) outperform children learning to read an orthographically inconsistent language (e.g., English or Danish) in word and nonword reading accuracy (e.g., Aro & Wimmer, 2003; Ellis et al., 2004; Seymour et al., 2003). If orthography plays a significant role in learning to read, then the predictive value of emergent literacy skills, home literacy practices, and motivational factors to later reading performance may also vary across languages.

Georgiou, Manolitsis, Nurmi, and Parrila (2010) argued that the extent to which task-focused versus task-avoidant behaviour would impact students' learning to read should vary according to how difficult or challenging a particular learning task is. The more demanding a particular task is, the more likely it will activate failure expectations among children leading to task-avoidant behaviour, which then increases problems in learning and the likelihood of failure in future (Onatsu-Arvilommi & Nurmi, 2000). Similarly, more demanding tasks may require more environmental support. In general, we can assume that task-focused behaviour and environmental factors should play a more important role in orthographically inconsistent languages than they do in orthographically consistent languages. The reason for this is that learning to read and write in an orthographically inconsistent language is a more demanding task than learning to

read and write in an orthographically consistent language, and therefore task-focused behaviour and environmental factors are more likely to contribute to the learning process.

The difficulty of literacy learning tasks, however, also varies within a particular language. It may be assumed, for example, that because word identification in languages with consistent grapheme-phoneme correspondences reaches high levels of accuracy soon after formal reading instruction begins (e.g., Greek) it does not require a high level of effort and subsequently task-focused behaviour and environmental factors will play a less important role in this learning process. However, reading fluency, spelling, and reading comprehension require more effort for an extended period of time no matter what the orthographic consistency is, and are, therefore, more likely to be influenced by task-focused behaviour and environmental factors.

In addition, many orthographies are much more consistent from graphemes to phonemes than from phonemes to graphemes. For example, Greek orthography has a high degree of regularity in reading, but irregularity in spelling[1] (i.e., the phoneme /i/ can be written in five different ways (η, ι, υ, ει, οι), the phoneme /o/ in two different ways (ο, and ω), and the phoneme /e/ in two different ways (ε and αι)). Thus, if task-focused behaviour and environmental factors become more important with increasing task demands, then a stronger effect on spelling followed by reading comprehension and reading fluency would be expected. In line with this prediction, Georgiou et al. (2010) found that task-focused behaviour accounted for unique variance in Grade 2 and Grade 3 spelling

and reading comprehension even after controlling for the effects of the autoregressor, nonverbal IQ, and phonological processing in a sample of Greek children. Georgiou et al., however, did not examine the role of home literacy practices. It is possible that task-focused behaviour and home literacy practices are not independent of each other, as it may be easier for a parent to engage and work with a child who is more task-focused, and thus the observed effect may reflect poorer home literacy practices. In addition, Georgiou et al. argued that research similar to theirs would be important in orthographically inconsistent languages, such as English, because all languages include more and less demanding features that children need to learn. Thus, one purpose of the present study was to examine the role of task-focused behaviour and environmental factors on spelling, reading comprehension, and reading fluency in Grade 3 in English- and Greek-speaking children, and to determine the effects of orthographic consistency and task demand on these relationships.

Because Stephenson, Parrila, Georgiou, and Kirby (2008) and Manolitsis et al. (2009) provided a recent review of studies examining the effect of environmental and behavioural factors on emergent literacy skills and early reading acquisition, the focus here will be on additional research on the effects of home literacy practices and motivational factors on later reading and spelling skills.

Emergent Literacy Skills and Reading

The relation between letter knowledge and reading has been well established in both consistent and inconsistent orthographies (e.g., Gallagher,

Frith, & Snowling, 2000; Kirby, Parrila & Pfeiffer, 2003; Leppänen, Aunola, Niemi, & Nurmi, 2008; Torppa, Poikkeus, Laakso, Eklund, & Lyytinen, 2006). Phonological processing skills, the ability to use information about sound elements of language in processing written and oral language (Wagner & Torgesen, 1987) are also strong predictors of individual differences in word recognition performance one to five years later (e.g., Gallagher, Frith, & Snowling, 2000; Parrila, Kirby, & McQuarrie, 2004; Wagner, Torgesen, & Rashotte, 1994; Wagner et al., 1997; for a review, see Adams, 1990). In the present study, the number of emergent literacy skills used in the analysis had to be limited due to sample size. Our choice of letter knowledge as the single emergent literacy skill was based on the findings of several studies. For example, Manolitsis et al.'s (2009) results showed that phonological sensitivity captured similar variance to letter knowledge in Grade 1 word decoding and fluency in both the English and Greek samples and, as a result, only letter knowledge was a significant predictor (see also Bruck, Genesee, Caravolas, 1997; Stephenson et al., 2008). Leppänen et al. (2008) also found that for a sample of Finnish-speaking students, letter knowledge was the most powerful predictor of reading skills at the end of Grade 4 and phonological awareness affected Grade 4 reading skills through reading skills in Kindergarten and Grade 1. Thus, although phonological sensitivity is an important predictor of reading achievement, letter knowledge was used as the emergent literacy skill measure as our previous papers found it to be better than and a largely redundant predictor of later reading than phonological sensitivity.

Home Literacy Practices (HLP) and Reading

A few studies have longitudinally examined the effects of both emergent literacy skills and shared book reading on reading skills beyond Grade 1 (e.g., Bruck et al., 1997; Hood, Conlon, & Andrews, 2008; de Jong & Leseman, 2001; Sénéchal & LeFevre, 2002; Sénéchal, 2006). These studies have shown that shared book reading in both consistent and inconsistent orthographies does not correlate significantly with word reading, word reading fluency, or spelling fluency beyond Grade 1 (de Jong & Leseman, 2001; Hood et al. 2008; Sénéchal, 2006). Shared book reading, however, has been shown to correlate significantly with reading comprehension skills measured after Grade1 in both English- and French-speaking samples (Sénéchal & LeFevre, 2002, and Sénéchal, 2006, respectively), but not in a Dutch-speaking sample (de Jong & Leseman, 2001). Thus, it is possible that shared book reading is a more important predictor of reading comprehension in languages that have more inconsistent orthographies (e.g., English and French).

A second aspect of HLP, parents' teaching activities, has been shown to correlate significantly with a Grade 3 measure of vocabulary and comprehension combined for an English speaking sample (Sénéchal & LeFevre, 2002). It has also been shown to correlate significantly with Grade 2 measures of word reading, word reading fluency, and spelling fluency for an English-speaking sample (Hood et al., 2008). After taking into account previous reading skills, however, parent teaching was no longer a significant predictor in these studies. Similarly, Sénéchal's (2006) results with a French-speaking sample indicated that parent

teaching activities were significantly correlated with Grade 4 spelling and reading comprehension skills, but not after controlling for emergent literacy skills. In contrast, parents' teaching activities predicted significantly Grade 4 text-reading fluency even after controlling for emergent literacy skills and Grade 1 word reading.

Manolitsis et al.'s (2009) results suggest that for both the English- and Greek-speaking samples, shared book reading was not associated with any of the Grade 2 reading outcome measures but parents' teaching activities were indirectly associated with the reading outcome measures through letter knowledge. In summary, there are mixed results regarding the relationship between parents' teaching activities and reading and spelling for orthographies varying in consistency. Studies with both consistent and inconsistent orthographies have indicated that parents' teaching activities are indirectly associated with reading and spelling skills through emergent literacy or previous reading skills. Only one study has demonstrated, utilizing a sample from a more inconsistent orthography that there is a direct relationship between parent teaching activities and Grade 4 text reading fluency (Sénéchal, 2006). Because of prolonged development of reading accuracy, it is possible that in inconsistent orthographies the effects of direct teaching on reading fluency are not present until after Grade 2. In the present study, I examine whether the effects of direct teaching on reading and spelling skills are present after Grade 2 and whether consistency of the orthography and task demand has an effect on these relationships.

Task-Focused Behaviour and Reading

Similar to the HLP, there are only a few studies that have examined the effects of task-focused behaviour beyond Grade 1, and most of them have been conducted with children who speak an orthographically consistent language (e.g., Hagtvet, 2000; Lepola, Salonen, & Vauras, 2000; Poskiparta, Niemi, Lepola, Ahtola, & Laine, 2003). These studies have generally found that task-focused behaviour is related to reading achievement. For example, Hagtvet (2000) found that Norwegian children who were poor readers at age 9 scored higher than good readers on a measure of task-avoidant behaviour at the age of 6, before formal reading instruction began. Similarly, Finnish children who were poor readers in Grade 2 showed significantly more task-avoidant behaviour in Kindergarten than their peers who were good readers (Poskiparta et al., 2003). Poskiparta et al. further suggest that this finding may be specific to children who lack decoding skills and does not generalize to children who are good decoders but lack comprehension skills. Lepola, Salonen, and Vauras (2000) reported that Finnish-speaking children with good decoding skills in Grades 1 and 2 displayed higher task-focused behaviour during kindergarten than did children with poor decoding skills, independently of the level of phonological sensitivity. However, this finding was not robust as only the difference between children with low phonological sensitivity and poor decoding skills and children with high phonological sensitivity and good decoding skills was statistically significant. Georgiou et al.'s (2010) results showed that task-focused behaviour accounted for unique variance in Grade 2 and 3 spelling and passage comprehension in a Greek

speaking sample, even after controlling for the effects of the autoregressor, nonverbal IQ, and phonological processing. In Manolitsis et al.'s (2009) study, task-focused behaviour predicted indirectly Grade 2 word and text-reading fluency via the autoregressor for the English-speaking sample, and predicted directly text-reading fluency for the Greek-speaking sample.

To summarize, the existing evidence generally supports a significant role for task-focused behaviour on reading achievement beyond Grade 1 in consistent orthographies, but few studies have examined this relation in inconsistent orthographies. Thus, one purpose of the present study was to examine the role of task-focused behaviour on spelling, reading comprehension, and reading fluency in Grade 3, and to determine the effects of orthographic consistency and task demand on these relationships.

Overview of the Present Study

Most existing studies on reading acquisition have focused either on the emergent literacy skills, environmental factors, or motivational factors. As a result, there is little understanding of the unique and joint contributions these sources make to successful reading acquisition. A better understanding of the relations among different predictor variables, and the effect of orthographic consistency and task demand are necessary for a more comprehensive theory of reading acquisition to emerge. The present study is a follow-up of our previous work on the effects of HLP and task-focused behaviour on emergent literacy skills and reading ability in Grades 1 and 2 (Manolitsis et al., 2009; Stephenson et al., 2008). Two important additions have been made in this study. First, I have

reassessed the same English- and Greek-speaking children on their word-reading fluency, reading comprehension, and spelling performance in Grade 3. Second, I examine how orthographic consistency and task demand affect the relationship between environmental and motivational factors on these outcome measures. The major questions addressed are: (a) Are home literacy practices and children's task-focused behaviour uniquely associated with better word reading fluency, reading comprehension, and spelling in Grade 3 after controlling for Kindergarten letter knowledge, vocabulary and Grade 1 word-reading fluency? and (b) What are the effects of orthographic consistency and task demands on these relationships?

Based on Manolitsis et al.'s (2009) findings, it was hypothesized that shared book reading would not correlate significantly with any of the reading outcomes. Based on several studies indicating that learning to read a consistent orthography is easier than learning to read an inconsistent orthography (e.g., Aro & Wimmer, 2003; Ellis et al., 2004; Seymour et al., 2003), it was expected that parents' direct teaching and task-focused behaviour would predict reading skills better in English-speaking children than in Greek-speaking children. It is likely that children learning to read English need more environmental support and better motivation to master reading and to overcome the inconsistent grapheme-phoneme relationships of the English writing system compared to children learning to read Greek. For spelling, however, it was expected that students in both languages would need more environmental support and motivation as both orthographies can be considered to be inconsistent for spelling. Finally, it is

expected that environmental and behavioural factors will be more important for reading comprehension than for reading fluency for both samples, as reading comprehension likely requires a higher level of effort because one must be able to read fluently and understand what was read.

Methods

Participants

Children

Letters of information describing the study were sent to parents of 223 kindergarten children in six suburban schools in St Albert, Alberta, Canada and to parents of 232 kindergarten children in four schools in Rethymno, Crete, Greece. One hundred sixty-one Canadian children and 177 Greek children were given parental permission to participate in the study. Of these, 77 (39 males and 38 females; 66.88 months, *SD* = 3.92) Canadian children and 95 Greek (50 males and 45 females; 67.01 months, *SD* = 2.93) children were randomly selected to be part of the present study. There were no children excluded based on linguistic or other grounds. All the participating children were native speakers of English and Greek, respectively. Twenty-six English-speaking children (33.8% of the initial sample) and 25 Greek children (29.5% of the initial sample) withdrew from the study by the end of Grade 3. These withdrawal numbers are similar to ones reported in previous longitudinal studies (e.g., Sénéchal, 2006). In order to examine if the performance of the 26 Canadian and 25 Greek children who withdrew differed significantly from the performance of the children remaining in the study, *t* tests were performed on the kindergarten measures. The results for the

Greek sample showed that the two groups of children differed significantly on vocabulary ($t = 1.98$, $p = .05$). The mean for the Greek children who withdrew was 39.96 ($SD = 4.63$) whereas the mean for the remaining 70 children was 58.56 ($SD = 2.96$). The results for the English sample showed that the two groups of children differed significantly on vocabulary ($t = 1.98$, $p = .05$) and letter sound knowledge ($t = 2.12$, $p < .05$). The mean vocabulary score for the English children who withdrew was 88.38 ($SD = 2.57$) whereas the mean for the remaining 51 children was 95.96 ($SD = 2.18$). The mean letter sound score for the English children who withdrew was 12.31 ($SD = 1.76$) whereas the mean for the remaining 51 children was 17.58 ($SD = 0.88$). Of the 51 remaining Canadian children, 6 children did not return the home literacy questionnaire, one student was missing one question on the home literacy questionnaire, and one student was missing letter sound data. Of the 70 remaining Greek children, 3 children did not return the home literacy questionnaire, two children had one question missing on the parent questionnaire, and one student was missing a score on letter-sound knowledge. The children who did not have home literacy environment data were removed from the sample leaving 45 English children and 67 Greek children. Of the 45 Canadian children included in the study 97 percent of were Caucasian, and 54 percent had attended preschool. Of the 67 Greek children included in the study all were Caucasian and 55 percent had attended preschool.

Parents

Parents of all the Kindergarten children received two questionnaires along with the letters of information and consent forms. The modal educational level for

Canadian mothers and fathers in the current sample was "completed community college," the minimum was "some high school" for the fathers and "completed high school" for the mothers. The maximum for both mothers and fathers was "completed graduate school". The modal educational level for Greek mothers and fathers was "completed high school", the minimum was "completed elementary school" and the maximum for mothers was "completed graduate school" and for fathers "completed university degree".

Teachers

All nine Canadian and twelve Greek Kindergarten teachers from the participating schools gave written consent to participate in the study. The teachers in each country filled out a questionnaire regarding task-focused behaviour (see below for details) for all the children participating in the study. All of the Canadian and Greek schools were part of the same school division and all of the teachers were female.

Reading Instruction

Reading instruction in Greece begins in Grade 1 in which children registered at the age of six years old (maximum at six and a half years old). Generally, most children begin school entering Kindergarten at the age of five. Some of them attend nursery schools already by the age of three. The current Greek National Kindergarten Curriculum concerning the Language section uses an emergent literacy perspective in which children trained mainly in concepts about print, reading whole words and emergent writing activities. Less attention is given in letter knowledge or phonological sensitivity activities. Children learn to

read at Grade 1 from the same reading book. Teachers must follow the National Curriculum guidelines using a phonics-based method. This means that all Greek children are instructed to read mainly in a similar way and their literacy instruction relies mainly on the schoolbook's content.

Reading instruction in Alberta (Canada), where the data for the English-speaking children were collected, begins at the age of five when the children attend kindergarten schools and becomes more systematic at the age of six when children are in Grade 1. The method of reading instruction used places emphasis on both grapheme-phoneme correspondences and on whole-word recognition strategies. This method of reading instruction is known as *Balanced Literacy Program* and it has been thoroughly described in many previous papers (e.g., Sénéchal & LeFevre, 2002; Sénéchal, LeFevre, Thomas, & Daley, 1998).

Measures

Vocabulary

Participants' vocabulary was assessed using the *Peabody Picture Vocabulary Test-Third Edition Form A (PVTT-IIIA;* Dunn & Dunn 1997). In this task, participants were shown four pictures and the examiner said a word to describe one of the four pictures. The participant was required to point to the correct picture for the word given by the examiner. Items were administered in sets of twelve. Testing was discontinued after eight or more errors within the highest set of items administered. The task was the same for the Greek sample but words were provided in Greek. Participants' score was the number of correct

items. Guttman's (1945) split-half reliability for PPVT-III for the English sample was 0.95 and 0.92 for the Greek sample.

Letter Knowledge

Letter-Name Knowledge in English was assessed by administering the Letter Identification test (Clay, 1993). Participants were asked to identify each of the upper and lowercase letters. Two lowercase letters, *a* and *g*, were presented in two different fonts, so the total possible score was 54. In Greek, the participants were asked to name each of the upper and lowercase Greek letters. The maximum score in Greek was 48. Cronbach's alpha reliability coefficient in our English- and Greek-speaking sample was .96 and .95, respectively.

Letter-Sound Knowledge in both languages was assessed by having participants give the sound of each uppercase letter presented in random order on a laptop screen. Testing was discontinued after six consecutive items were incorrect. Participants' score was the total number correct. The maximum score is 26 for English and 24 for Greek. Cronbach's alpha reliability coefficient in our English- and Greek-speaking sample was .90 and .95, respectively.

Home Literacy

Home Literacy in both languages was assessed with four Likert-scale questions. Parents were asked (1) how often their child was taught to identify letters; (2) how often their child was taught letter sounds; and (3) how often their child was taught to read words when the child was 2 to 4 years of age. In addition, they were asked (4) how often their child is read to at home. For these questions, the six-point Likert-scale ranged from *never* to *more than once a day*. In the

present study, parents' reports of their children being taught letter names, letter sounds, or to read words were correlated (*English*: $r = .79$ for teaching letter names and letter sounds; $r = .63$ for teaching letter sounds and to read words; $r = .42$ for teaching letter names and to read words; *Greek*: $r = .81$ for teaching letter names and letter sounds; $r = .70$ for teaching letter sounds and to read words; $r = .73$ for teaching letter names and to read words). Question about frequency of reading, however, correlated only weakly (*English*: .22, .34, and .42; *Greek*: .25, .25, and .16) with teaching letter names, letter sounds, and word reading, respectively. Thus, rather than making a single reading activity score, the standard scores of the three teaching questions were summed together to make a single variable, Direct Teaching, whereas the reading frequency question was kept separate. Cronbach's alpha coefficient for Direct Teaching was .82 for English and .90 for Greek. Thus, two different home literacy indicators are reported below: Direct Teaching and Reading Frequency.

Task-Focused Behaviour

Kindergarten teachers were asked to evaluate the behaviour of each child using the Behavioural Strategy Rating Scale-II (BSR-II; Aunola, Nurmi, Parrila, & Onatsu-Arvilommi, 2000). Teachers were asked to think of a specific classroom situation and then rate the child's behaviour using seven statements assessed with a five-point Likert-scale that ranged from *very much/easily* to *not at all*. Five questions assessed children's use of task-focused versus task-avoidant behaviour (for the actual items, see Stephenson et al., 2008). Cronbach's alpha coefficient for Task-Focused behaviour was .97 for English and .94 for Greek.

Word Reading Fluency

Test of Word Reading Efficiency (TOWRE; Torgesen, Wagner, & Rashotte, 1999) was used as a measure of word reading efficiency in English. The child is given a list of 104 words, divided into four columns of 26 words each, and asked to read them as fast as possible. A short, 8-word practice list is presented first. The number of words read correctly and the number of errors made within a 45-second time limit was recorded. The score was the number of words read correctly. Torgesen et al. (1999) reported test-retest reliability of .95 for ages six to nine. The Greek version of this task had the same format as the English one. It consisted of 104 words beginning with one-syllable words and ending with three syllable words. However, the Greek version of the task had longer words compared to the English task. More specifically, although the Greek TOWRE contained 644 characters, the English TOWRE contained 607 characters.

Passage Comprehension

The Woodcock Reading Mastery Tests-Revised battery (Form H; Woodcock, 1987) was used to assess Passage Comprehension in English in Grade 3. Participants were asked to read 68 sentences or short passages and fill in the missing word that was important to the meaning of the sentence or passage. The children were required to supply the missing word that fitted the meaning of each sentence or passage. The task was discontinued after four consecutive mistakes and the individual's score was the total number of correct responses. Guttman's (1945) split-half reliability coefficient in our English-speaking sample was .89.

This task in Greek was adapted from Woodcock's (1998) Passage Comprehension task and required the children to read 68 sentences or short passages missing a word that was important to the meaning of the sentence or passage. The children should supply the missing word that fitted the meaning of each sentence or passage. The task was discontinued after four consecutive mistakes. The individual's score was the total number of correct responses. Split-half reliability coefficient in our sample was .91 for Grade 3.

Spelling

The Wide Range Achievement Test 3 (WRAT 3; Wilkenson, 1993) was used to assess spelling in English and adapted version was used for Greek children. Children were asked to write on a form with numbered spaces a word that was dictated to them. The examiner first reads the word aloud, then reads a sentence in which the target word is embedded, and then repeats the target word. The WRAT 3 consists of 40 words. In Greek the 40 words were taken from children's Grade 1 to Grade 3 language textbooks (15 words from Grade 1, 15 from Grade 2, and 10 from Grade 3 language textbooks). Half of the words were regular and the other half irregular. Nine words were two-syllable words, 15 three-syllable words, 10 four-syllable words, 3 five-syllable words, and 3 six-syllable words. The number of words in each syllabic category roughly represents the corresponding percentage in the Hellenic National Corpus (Hatzigeorgiou et al., 2000; hnc.ilsp.gr). A participant's score was the number of correctly spelled words. A cut-off rule of five consecutive mistakes was applied. Split-half

reliability coefficient in our sample was .86 and .95 for English and Greek, respectively.

Procedure

All participants in both languages were tested individually in their respective schools during school hours by trained experimenters in both countries (two Canadian graduate research assistants and four Greek graduate research assistants). The children in both countries were tested in April/May of Kindergarten and Grade 1, and in February/March of Grade 3 in Canada and April / May of Grade 3 in Greece. In Kindergarten the tests were administered in two sessions lasting approximately 35 minutes each. In the first session, Letter-Name Knowledge was administered whereas in the second session PPVT-III and Letter-Sound Knowledge were administered. In Grade 1, TOWRE was administered in one session. In Grade 3 TOWRE, Passage Comprehension and Spelling were administered in one session. Word Attack was not administered in Grade 3 on the basis of the findings of previous studies conducted in Greek showing that word decoding is close to ceiling by Grade 2 with minimal variability in the distribution of scores (see e.g., Georgiou et al., 2008; Porpodas, 1999).

Statistical Analysis

The statistical analysis was conducted in two steps using path analysis. Path analysis is a type of structural equation modeling with observed variables used instead of latent factors (Loehlin, 2004). The first step involved the identification of those measures that predicted significantly reading and spelling outcomes in Grade 3 in the two languages separately. PPVT-III was used as a

control variable and was left in the path analysis models even if it was not significantly related to the dependent variables. Because age of the participants was not significantly related to any dependent variables in the study it was left out of the analyses. In each one of the path analyses, all variables were allowed to correlate with each other.

Next, the cross-linguistic differences in the predictors of TOWRE, passage comprehension and spelling in Grade 3 were examined by performing multi-group analyses in two steps. First, the fit of a model in which no cross-group constraints were imposed was tested. Second, I tested the invariance of the regression paths in the two language groups by imposing equality constraints on the direct and indirect effects of the predictor variables on the criterion variables. In testing for the invariance of the regression paths, the χ^2 value of the constrained model was compared with that of the initial multi-group model in which no cross-language constraints were imposed. If the difference in χ^2 values, given the difference in the degrees of freedom between the two models (*df* constrained – *df* unconstrained), was significant, then this indicated that the specific predictor was contributing in a different way to the outcome variable in the two languages.

Results

Preliminary Data Analysis

Table 4-1 presents the descriptive statistics for all the measures. In terms of the general performance level of the current sample, results shown in Table 4-1 suggest that English-speaking students recognized approximately 40 of the 54 upper and lower case letters presented but only knew the sounds for

approximately 17 uppercase letters. The Greek-speaking students recognized approximately 8 of the 54 upper and lower case letters presented but knew the sounds for approximately 12 uppercase letters. For the Home Literacy Practices (HLP), Canadian parents reported storybook reading occurred in the home about once a day, which is similar to Frijters et al.'s (2000) finding that parents reported reading to their children between seven and nine times per week. Greek parents reported reading to their child a few times a week. Similar to Sénéchal et al.'s (1998) findings that parents reported teaching their child to read words sometimes, both Canadian and Greek parents in the present study reported that their child was taught to read words a few times a month.

Finally, on the Behaviour Strategy Rating Scale (BSR-II), which was filled out by the teachers, both English and Greek speaking children in the present study were rated as having slightly higher levels of task-focused behaviour compared to students in Aunola et al.'s (2002) study, who were in the beginning of Grade 1. This could reflect the fact that the current sample was approximately one and a half years younger than Aunola et al.'s sample and therefore teachers' expectations may have been lower in the present study.

Distributional properties and correlations between the measures were examined next. Of the pre-literacy skills, raw scores on Letter Name and Sound Knowledge showed a floor effect for the Greek sample (25.4% and 3% of the sample, respectively, scored 0). Letter Name Knowledge and Letter Sound Knowledge showed a small ceiling effect for the Canadian sample (4.4% and 4.5% of the sample, respectively, solved all items correctly). To limit the effect of

task specific variability, I combined Letter Name Knowledge and Letter Sound Knowledge, which were highly correlated (English: $r = .73$; Greek: $r = .54$). Their z-scores were combined to form a single variable, Letter Knowledge, which was used in all subsequent analyses. An examination of the distributional properties of the Letter Knowledge variable indicated that it was slightly negatively skewed for the Canadian sample and positively skewed for the Greek sample. One Canadian child's score and three Greek children's scores were more than two standard deviations from the group mean. The responses of these outliers were replaced by a value equal to the next highest non-outlier score plus one unit of measurement (Tabachnick & Fidell, 2001). Changing the outlier score in the Canadian sample resulted in a normal distribution but the Greek sample distribution remained skewed. Transformations on the Greek Letter Knowledge data did not change results significantly so the non-transformed scores were used in all correlational analyses.

An examination of the Canadian sample's Grade 3 TOWRE distribution indicated that one student's score was more than two standard deviations above the mean and one student's score was more than two standard deviations below the mean. Both scores were replaced by a value equal to the next highest non-outlier score plus one unit of measurement (Tabachnick & Fidell, 2001). No transformations were required as the data was normally distributed.

Of the Home Literacy Practices questions, parents' reports of their child being taught letter names, letter sounds, or to read words were highly correlated in the Canadian and Greek samples ($r = 0.79$ and $r = 0.81$ for teaching letter names

and letter sounds, respectively; $r = 0.63$ and $r = 0.74$ for teaching letter sounds and to read words, respectively; $r = 0.42$ and $r = 0.70$ for teaching letter names and to read words, respectively). Thus, the standard scores of the three teaching questions were summed together to make a single variable, Direct Teaching, which was used in all correlational analyses.

Finally, an examination of the distributional properties of the Behavioural Strategy Rating Scale-II indicated that Task-Focus scores for both language groups were slightly negatively skewed and showed a ceiling effect (about 18% of the Canadian sample and 13% of the Greek scored 25). Transformation did not improve the distributional properties significantly so non-transformed scores were used in further analyses.

Correlations Between Variables

Table 4-2 displays the correlations obtained for all the measures separately for the two language groups (Greek above the diagonal and English below the diagonal). Letter knowledge was significantly related to the reading and spelling outcomes in both languages. A different pattern of relationships showed up for PPVT across the two languages. In English, PPVT was significantly correlated to the Grade 3 reading and spelling outcomes. In contrast, in Greek PPVT was only related significantly to Grade 3 Passage Comprehension.

In terms of the Home Literacy Practice (HLP) variables, Direct Teaching did not correlate significantly with PPVT or Task-Focused behaviour in English or Greek. Shared book reading correlated significantly with Task-Focused behaviour in the English sample but not the Greek sample. Shared book reading

correlated significantly with PPVT in the Greek sample and approached significance in the Canadian sample (p = 0.051). Direct Teaching and shared book reading correlated significantly with Letter Knowledge in the Canadian sample, but not the Greek. Direct Teaching and shared book reading did not correlate significantly with any of the reading and spelling outcome measures in either language. Therefore, the HLP variables were not used in the path analysis. Finally, Task-Focus correlated significantly with PPVT and Letter Knowledge in English, but not in Greek. Task-Focus was correlated significantly with passage comprehension and spelling in both languages but not with Grade 1 or 3 TOWRE.

To summarize, we found both similarities but also differences in the relationship between the different measures used in this study across languages. Perhaps the most evident similarity across languages was letter knowledge's strong relationship with the reading and spelling outcomes. In contrast, PPVT and Task-Focus appear to be more important for reading in English than in Greek.

Path Analyses

Predicting Word Reading Fluency

Figure 4-1 shows the results of path analysis with Grade 3 TOWRE as the dependent variable. Italicized values on figures indicate R^2. Letter Knowledge and PPVT predicted significantly TOWRE in the English model and together the predictors accounted for 25% of the variance in TOWRE. In the Greek model, Letter Knowledge was the only significant predictor of TOWRE. In total, the model accounted for 13% of the variance in TOWRE.

Figure 4-2 presents the model in which Grade 3 TOWRE is the dependent variable and Grade 1 TOWRE is controlled. In English and Greek, with Task-Focus, Letter Knowledge, and PPVT in the model, only Letter Knowledge predicted Grade 1 TOWRE significantly. PPVT directly predicted Grade 3 TOWRE in the English-speaking sample. The total model accounted for 34% of the variance in Grade 3 TOWRE for English and 43% of the variance in Grade 3 TOWRE for Greek.

After establishing the baseline model separately for the two languages I examined if there were any significant differences in the predictors of TOWRE across the two languages. The multi-group analyses showed that significant changes in χ^2 were observed when the effects of PPVT ($\Delta\chi^2 = 4.97$, $p < .05$) and Grade 1 TOWRE ($\Delta\chi^2 = 10.03$, $p < .01$) were constrained to be equal across the two languages (see Table 4-3). In sum, these findings suggest that Grade 1 TOWRE is a stronger predictor of Grade 3 TOWRE in the Greek sample and PPVT is a stronger predictor of Grade 3 TOWRE in the English-speaking sample.

Predicting Passage Comprehension

Figure 4-3 shows the results of path analysis with passage comprehension as the dependent variable. In English, PPVT and Letter Knowledge were significant predictors of passage comprehension. In total, the model accounted for 49% of the variance. In Greek, only PPVT approached significance ($p = 0.055$), and in total the model accounted for 17% of the variance. Next, I examined the effects of PPVT, Task-Focus, and Letter Knowledge on passage comprehension when Grade 1 TOWRE was included in the model (see Figure 4-4). In English

and Greek, only Letter Knowledge significantly predicted Grade 1 TOWRE. PPVT and Grade 1 TOWRE directly predicted Grade 3 passage comprehension in the English-speaking sample and no variables directly predicted Grade 3 TOWRE in the Greek-speaking sample, although PPVT approached significance (p = 0.051). The total model accounted for 57% of the variance in Grade 3 passage comprehension for the English sample and 20% of the variance in Grade 3 passage comprehension for the Greek sample.

Lastly, I examined whether PPVT or Grade 1 TOWRE predicted passage comprehension differently in the two languages. The multi-group analyses showed that significant changes in χ^2 were observed when the effect of PPVT ($\Delta\chi^2$ = 5.88, $p < .05$) was constrained to be equal across the two languages (see Table 4-3). The effect of PPVT was significantly greater in English than in Greek.

Predicting Spelling

In Figure 4-5 the results of the path analysis with spelling as the dependent variable are reported. Letter Knowledge was the only significant predictor of spelling in English and the total model accounted for 25% of the variance. In Greek, Letter Knowledge and Task-Focus were significant predictors of spelling. In total, the model accounted for 31% of the variance in spelling. Next, I examined if Task-Focus or Letter Knowledge predicted spelling differently in the two languages. The multi-group analyses showed that significant changes in χ^2 were observed when the effect of Letter Knowledge ($\Delta\chi^2$ =10.01, $p < .01$) was constrained to be equal across the two languages (see Table 4-3). The effect of Letter Knowledge was significantly greater in Greek.

Total Effects of the Predictor Variables on the Outcome Variables

Table 4-4 shows the standardized estimates of the total mediated effects of PPVT, Letter Knowledge and Task-Focused behaviour on Grade 3 TOWRE, passage comprehension and spelling in English and Greek. These estimates indicate that with Grade 1 TOWRE as the mediator, in both languages PPVT was more important for passage comprehension than spelling and TOWRE. In Greek PPVT was only important for passage comprehension whereas in English it was also important for TOWRE. Letter Knowledge was approximately equally important for Grade 3 TOWRE, passage comprehension and spelling in English. In Greek, Letter Knowledge was more important for spelling and TOWRE. Across languages the contribution made by Letter Knowledge is comparable for TOWRE, and larger for passage comprehension in English and spelling in Greek. Across languages Task-Focused behaviour was similarly important and was more important for passage comprehension and spelling than TOWRE. Taken together with the SEM results, it can be concluded that the differences in the predictors of reading in the two languages are more obvious when PPVT is the predictor of TOWRE and passage comprehension. When spelling is the outcome then the total (mediated and direct) effects of Letter Knowledge appear to be higher in Greek than English.

Discussion

The present study examined the longitudinal effects of environmental and motivational factors, home literacy practices and task-focused behaviour on reading and spelling in children learning to read and spell in an orthographically

inconsistent language (English) and an orthographically consistent language (Greek). Our findings suggest that there are both similarities but also differences in the predictors of reading and spelling across languages that vary in orthographic consistency.

Predicting Reading Fluency, Passage Comprehension, and Spelling

The first objective of this study was to examine the joint contribution of HLP, task-focused behaviour, and letter knowledge on reading fluency, passage comprehension, and spelling in Grade 3. Notably, none of the HLP measures were significantly correlated with any of the dependent measures and this finding was consistent across languages. Thus, the HLP were not included in further analyses. Task-focused behaviour predicted significantly spelling in Greek. Letter knowledge predicted significantly all reading and spelling outcomes in both languages except for passage comprehension in Greek. PPVT predicted significantly passage comprehension and TOWRE in English beyond the effects of reading ability in Grade 1, but not in Greek (approached significance for passage comprehension in Greek). In the Greek data, nothing directly predicted passage comprehension, and only Grade 1 TOWRE significantly predicted Grade 3 TOWRE. The strong autoregressive (reading ability at an earlier point in development) effect on Grade 3 TOWRE in both languages was expected on the basis of previous longitudinal studies (e.g., de Jong & van der Leij, 1999; Wagner et al., 1997).

Our hypothesis that HLP would predict reading and spelling better in Canadian than in Greek children was rejected. These results support previous

findings indicating no direct effects of parents' shared book reading or teaching on reading development beyond Grade 1 (e.g., Hood et al., 2008; Sénéchal & LeFevre, 2002). One possible reason is that the HLP variables were not measured concurrently with the outcome measures but were measured when the children were in Kindergarten. Of the HLP variables only shared book reading correlated significantly with task-focused behaviour and only in the Canadian sample. This finding suggests that the HLP and task-focused behaviour are independent of each other in this age group, and whether a parent taught their child letter names, sounds and to read words was not dependent on whether the child was rated as task-focused by their teacher.

Task-focused behaviour did not predict directly Grade 1 or 3 word-reading fluency in either language. This finding is in contrast to Manolitsis et al.'s (2009) findings in which task-focused behaviour significantly predicted Grade 1 word-reading fluency in English but not in Greek. The likely reason task-focused behaviour did not predict significantly word reading fluency in the Grade 1 English sample in our study is because of reduced power due to a smaller sample size. Our finding and Manolitsis et al.'s findings are similar to those of Lepola et al. (2005) showing that task orientation (similar to task-focused behaviour) measured in preschool did not predict significantly Grade 1 word-reading fluency (e.g., timed matching picture-word pair task) in children learning to read Finnish. Lepola et al., however, found that task orientation measured in the fall of Grade 1 predicted significantly spring Grade 1 word-reading fluency. It is possible that significant effects are found when task-focused behaviour is measured in shorter

time intervals. For example, Aunola et al. (2002) found significant effects of task focused behaviour (measured four times within a single grade) on future reading and that reading was predicting future task-focused behaviour.

Although Task-focused behaviour did not directly predict word-reading fluency, it predicted significantly spelling in Greek. However, the difference in the strength of the path weights was not significant across languages (see Table 4-3). Overall, task-focused behaviour was similarly important across languages and more important for spelling and passage comprehension than TOWRE (see Table 4-4). This finding is consistent with Georgiou et al.'s (2009) study that found task-focused behaviour to be a significant predictor of spelling and passage comprehension, but not of word-reading fluency for a Greek sample. Conceivably, spelling and passage comprehension in both languages are more demanding tasks than word reading fluency because they require more effort for a longer period of time. For example, the word-reading fluency task in the present study only required the students to be focused for 45 seconds at a time.

The present study also revealed some important findings concerning the contribution of vocabulary and letter knowledge on later reading achievement. Vocabulary predicted significantly Grade 3 passage comprehension and word-reading fluency in English and approached significance in Greek ($p = 0.051$) for passage comprehension. This is consistent with the majority of studies that have emphasized the importance of vocabulary on Grade 3 passage comprehension (Leseman & de Jong, 2001; Sénéchal & LeFevre, 2002; Sénéchal, 2006). Overall PPVT was a more important predictor in English than in Greek across all tasks

(see Table 4-4). This is in line with a recent study by Nation and Cocksey (2009) in which the relationship between vocabulary and reading words aloud was stronger when words contained irregular spelling-sound correspondences. It also makes sense that vocabulary knowledge would be more important when spelling in English than in Greek because fewer words in English can be spelled purely based on phonetics without knowledge of what the word means.

Letter knowledge was the best predictor of word reading fluency in Grade 1 for both language groups. This is consistent with previous studies showing that letter knowledge is a strong predictor of later reading ability in both consistent and inconsistent orthographies (e.g., Bruck et al., 1997; Gallagher, Frith, & Snowling, 2000; Kirby, Parrila & Pfeiffer, 2003; Leppänen, Aunola, Niemi, & Nurmi, 2008; Torppa, Poikkeus, Laakso, Eklund, & Lyytinen, 2006). Overall, when Grade 1 word reading fluency was controlled, letter knowledge predicted spelling better in Greek than English (see Table 4), but it was still an important predictor of spelling in English. This could again be related to the fact that in order to spell in English letter knowledge is not enough.

Limitations

Some limitations of the current study are worth mentioning. First, the findings can be generalized only to the languages under investigation and for the ages of the participants in the present sample. Many researchers have used Greek as an example of a consistent orthography (e.g., Ellis et al., 2004; Seymour et al., 2003) but there are still objections to this conceptualization (e.g., Miles, 2000). To the extent that the purpose of this study was to identify differences in processes

involved in reading and spelling in a consistent orthography and in an inconsistent orthography, then using Greek might not have been an optimal solution compared to languages such as Finnish or Turkish, which are considered close to 100% consistent.

Second, the reading fluency, passage comprehension, and spelling tasks were not strictly matched in the two languages. Greek and English belong to different families of languages and have different orthographic and phonological characteristics. For example, there is a large body of short single-syllable words in English, whereas there are only few of these words in Greek. Given the number of single-syllable words used in existing reading tests in English (see e.g., Woodcock Reading Mastery Tests-Revised; Woodcock, 1998), it is not possible to construct word reading tasks in Greek that would be strictly parallel in terms of length and word frequency to the English ones. On the other hand, using more multi-syllabic words in English likely will not create an equal task because of significant differences in the syllable structures between Greek and English.

Third, a self-reported questionnaire was sent to the parents to collect information on HLP. This may result in two kinds of problems: First, as Bus et al. (1995) pointed out, the question "How frequently do you read to your child?" may be ambiguous and interpreted inconsistently by the parents. For example, some parents may classify two books read in one day as a single reading event, whereas other parents may consider two books read in a one day as two reading events. Second, the requirements to indicate frequency of reading at home and frequency

of teaching letter sounds and words is subject to a social-desirability bias if parents attach a high value to these aspects of HLP.

Fourth, the amount of variance accounted for in the Grade 3 reading and spelling outcomes was relatively small. This suggests that there are important predictors of reading acquisition in each language that were not incorporated in the study. For example, a substantial body of research has indicated that rapid naming speed is a strong predictor of reading in both orthographically consistent (e.g., *Dutch*: de Jong & van der Leij, 1999; *Finnish*: Lepola et al., 2005; and *German*: Mayringer, Wimmer, & Landerl, 1998) and orthographically inconsistent languages (e.g., *English*: Bowers & Swanson, 1991; Compton, 2003; Georgiou, Parrila, & Kirby, 2006; *French*: Plaza & Cohen, 2007) accounting for significant amount of variance over and beyond letter knowledge (e.g., de Jong & van der Leij, 1999; Kirby et al., 2003). Thus, the inclusion of rapid naming speed could have increased the amount of explained variance in the Grade 3 reading outcomes in both languages.

Finally, a larger sample size in both language groups would be desirable. For the type of analyses ran in this study the sample size was barely adequate. Thus, future studies should strive to replicate these findings with a larger sample size.

Psychoeducational Implications

Overall, letter knowledge has been shown to be the best predictor of reading and spelling in both languages. Vocabulary knowledge was also an important predictor of word reading fluency and comprehension in English. Thus,

parents as well as Kindergarten teachers should foster children's letter knowledge and vocabulary by teaching them directly letter names and sounds, and meanings of words. At the same time, our findings suggest that letter knowledge should be part of every diagnostic tool for reading difficulties.

Table 4-1

Descriptive Statistics for all the Measures Used in the Study

	Greek					English				
	M	SD	Min	Max	N	M	SD	Min	Max	N
Control Variables										
PPVT-III	58.01	25.09	13	120	67	97.33	14.78	68	130	45
Emergent Literacy Skills										
Letter Name Knowledge	7.60	12.34	0	48	67	40.13	12.49	12	54	45
Letter Sound Knowledge	11.94	7.66	0	24	66	17.50	6.45	1	26	44
Home Literacy Environment										
Frequency of Reading to Child[a]	3.40	.85	1	5	67	4.02	.72	2	5	45
Teach to Identify Letters[a]	2.29	1.30	0	5	66	3.20	1.24	0	5	45
Teach Letter Sounds[a]	2.31	1.26	0	5	67	2.84	1.41	0	5	45
Teach to Read Words[a]	1.68	1.41	0	4	66	2.20	1.30	0	5	44
Achievement Strategies										
Task-Focus	18.04	6.04	5	25	67	17.47	6.88	5	25	45
Grade 1 Reading										
TOWRE	26.51	11.25	0	49	67	36.67	14.06	1	69	45
Word Attack	33.18	7.98	5	43	66	17.36	9.25	3	37	45
Grade 3 Reading										
TOWRE	47.79	12.26	1	75	67	63.89	8.85	45	82	45
Passage Comprehension	26.36	5.80	14	43	67	35.04	5.61	20	44	45
Spelling	19.48	9.37	0	36	67	13.09	3.01	6	20	45

Note. [a]0 = never; 1 = less than once a month; 2 = a few times a month; 3 = a few times a week; 4 = about once a day; 5 = more than once a day; 1 = not at all well; 5 = very well

Table 4-2
Correlations Between Predictor and Outcome Variables (Greek above the diagonal and English below the diagonal)

	1.	2.	3.	4.	5.	6.	7.	8.	9.
1. PPVT-III		.02	.36**	.19	.22	.11	.07	.30*	.14
2. Direct Teaching	.07		.24*	-.24	.19	.00	.08	.04	.10
3. Read to Child	.29	.39**		.08	.12	.05	.05	.03	.00
4. Task-Focus	.44**	.19	.37*		.19	.14	.17	.28*	.31*
5. LK	.33*	.44**	.47**	.42**		.45**	.32**	.26*	.50**
6. TOWRE_G1	.07	.04	-.02	.26	.48**		.65**	.29*	.54**
7. TOWRE_G3	.37*	.23	.03	.29	.42**	.37*		.25*	.65**
8. PC_G3	.60**	.16	.20	.51**	.49**	.46**	.44**		.45**
9. SPELL_G3	.31*	.26	.10	.37*	.44**	.51**	.61**	.63**	

Note. LK = Letter Knowledge; TOWRE = Test of Word Reading Efficiency; G1 = Grade 1; G3 = Grade 3.
* $p < .05$. ** $p < .01$.

Table 4-3
Changes in χ^2 After Constraining Paths to be Equal Across Language Groups

	TOWRE	PC	SPELL
$PPVT_E = PPVT_G$	4.97*	5.88**	
$TF_E = TF_G$			2.13
$LK_E = LK_G$			10.01**
$TOWRE\text{-}GR1_E = TOWRE\text{-}GR1_G$	10.03**	0.13	

Note. TF = Task-Focus; LK = Letter Knowledge; TOWRE = Test of Word Reading Efficiency; PC Passage Comprehension
$_E$ = English; $_G$ = Greek.
* $p < .05$. ** $p < .01$.

Table 4-4

Total Effects of PPVT, Letter Knowledge and Task-Focused Behaviour on Grade 3 TOWRE, Passage Comprehension and Spelling

	English[a]			Greek[b]		
	TOWRE	PC	SPELL	TOWRE	PC	SPELL
PPVT	.304	.418	.128	-.015	.223	-.002
Letter Knowledge	.294	.268	.332	.321	.182	.468
Task-Focused	.035	.218	.178	.116	.199	.218

Note. PPVT = Vocabulary; TOWRE = Test of Word Reading Efficiency; PC = Passage Comprehension.
[a] $N = 45$; [b] $N = 67$.

Figure 4-1. Baseline path model of predictors of TOWRE in Grade 3 in English (a) and Greek (b).

* $p < .05$. ** $p < .01$. *** $p < .001$.

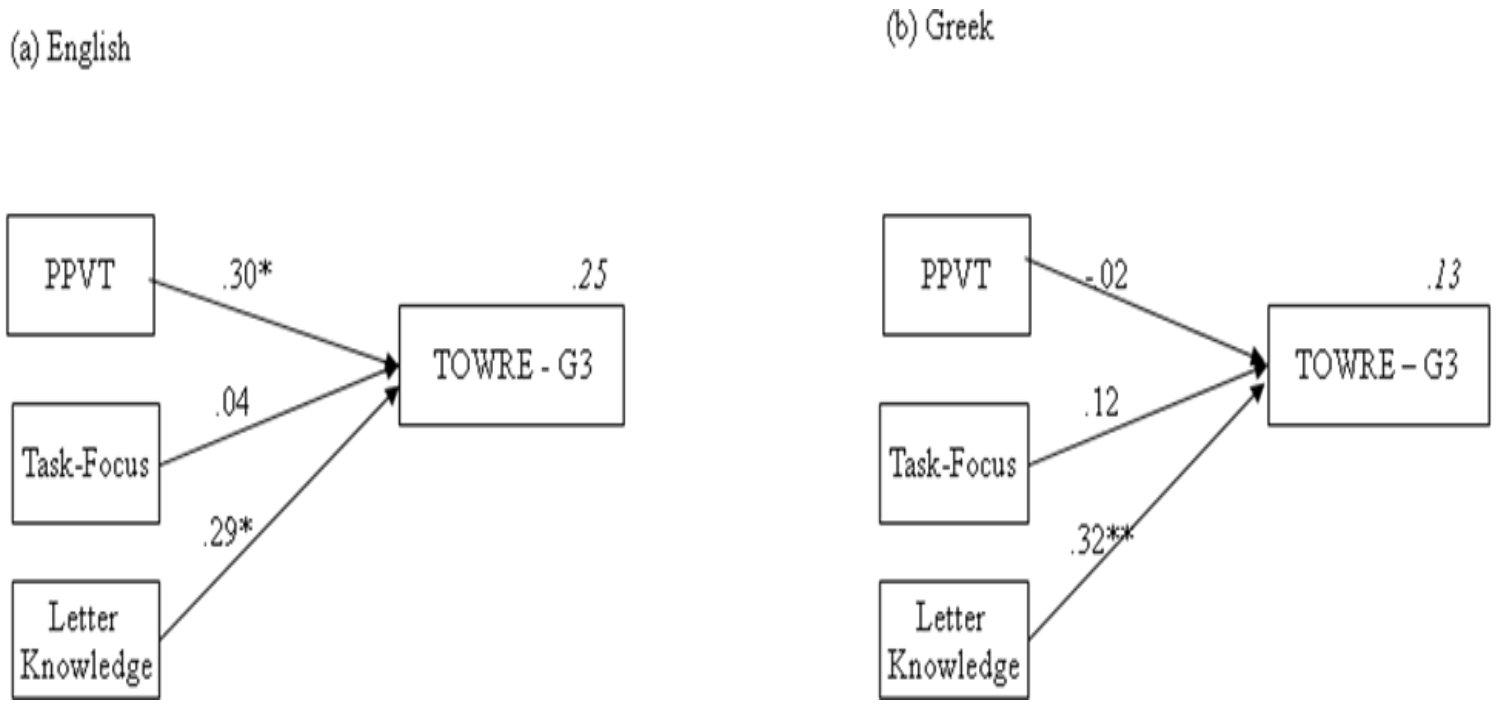
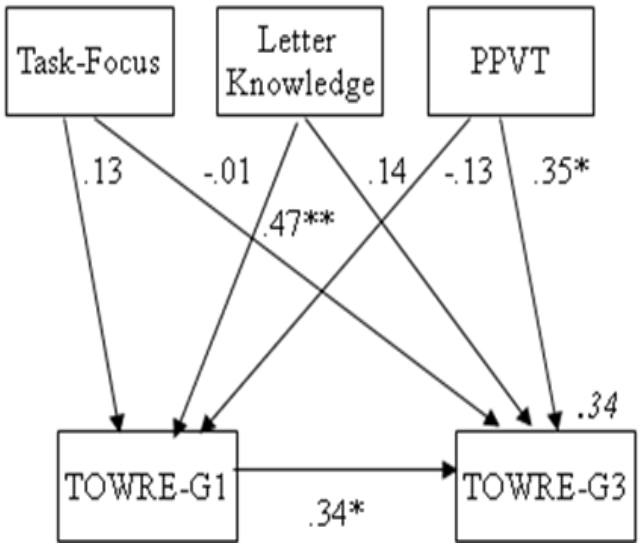


Figure 4-2. Predictors of TOWRE in Grade 3 in English (a) and Greek (b) with the autoregressor controlled.

* $p < .05$. ** $p < .01$. *** $p < .001$.

(a) English



(b) Greek

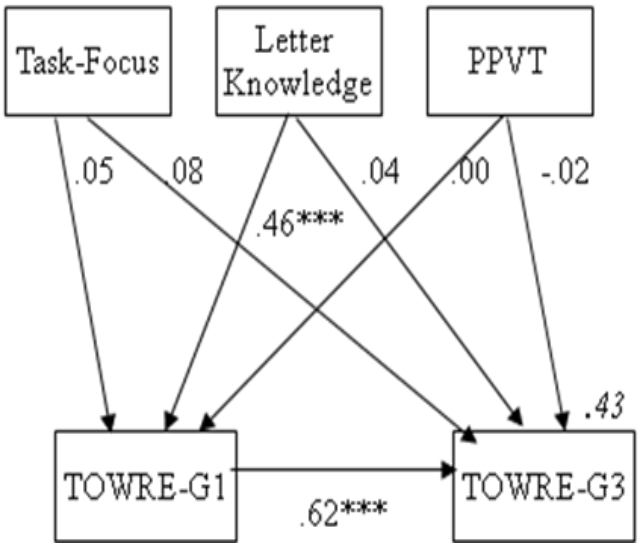


Figure 4-3. Baseline path model of predictors of Passage Comprehension in Grade 3 in English (a) and Greek (b).

* $p < .05$. ** $p < .01$. *** $p < .001$.

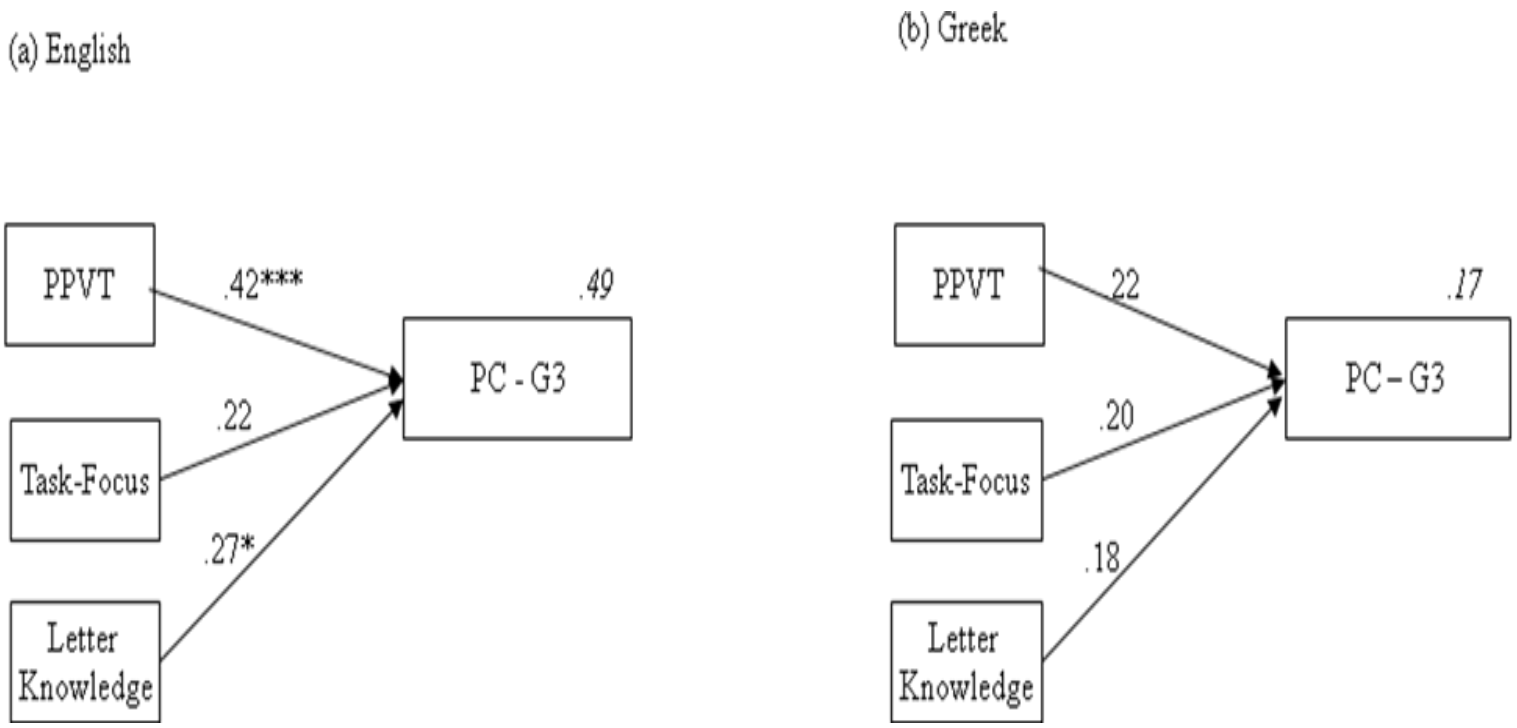
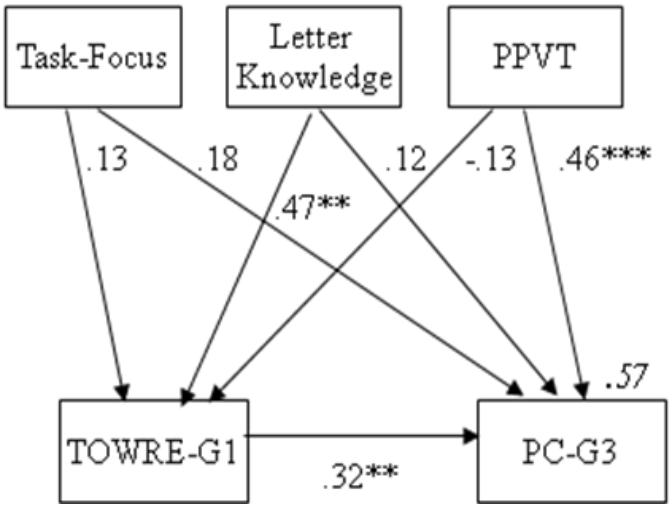


Figure 4-4. Predictors of Passage Comprehension in Grade 3 in English (a) and Greek (b) with Grade 1 TOWRE as a control variable.

* $p < .05$. ** $p < .01$. *** $p < .001$.

(a) English



(b) Greek

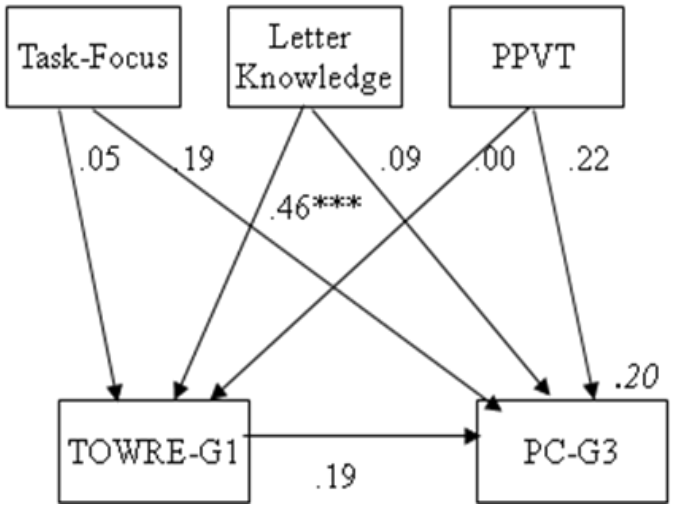
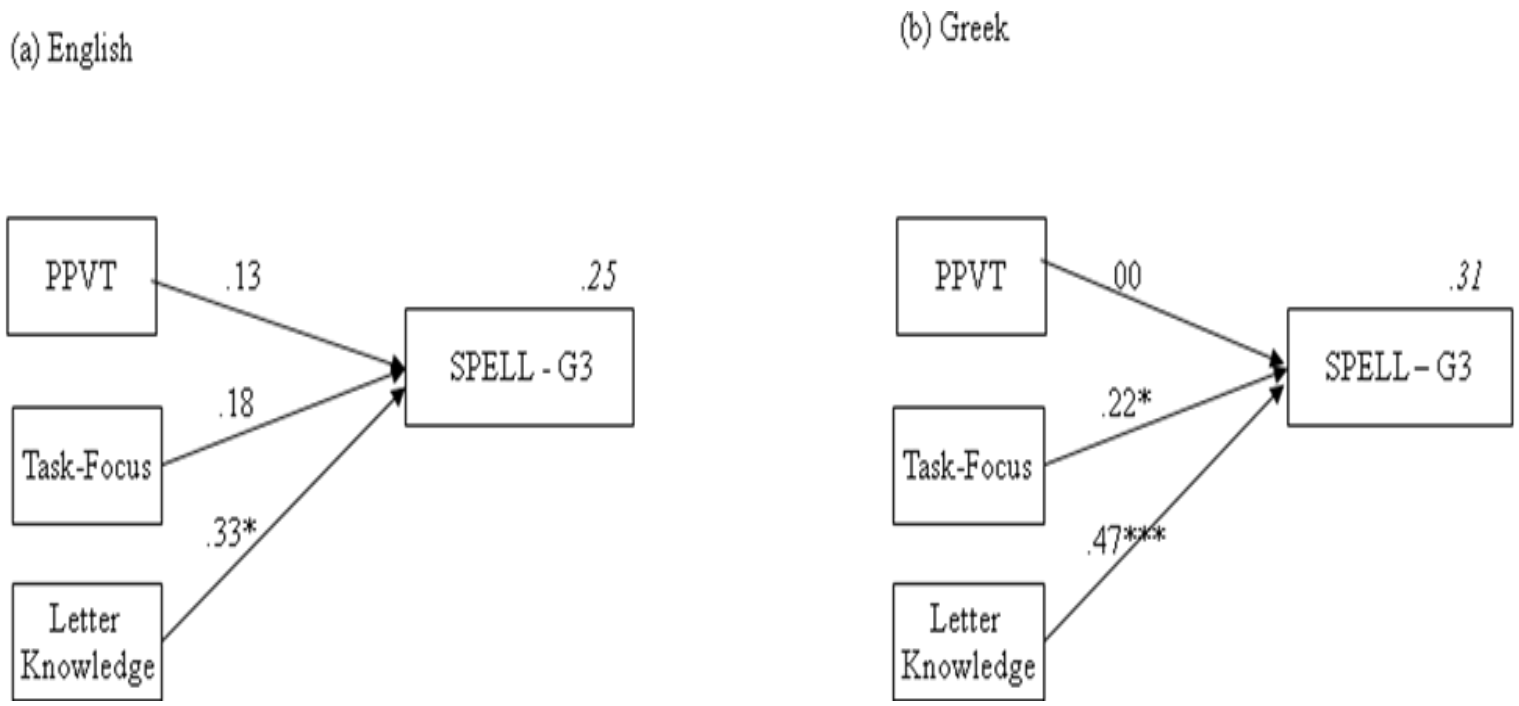


Figure 4-5. Baseline path model of predictors of Spelling in Grade 3 in English (a) and Greek (b).

* $p < .05$. ** $p < .01$. *** $p < .001$.



Endnotes

[1] Recently, Protopapas and Vlachou (in press) quantified the consistency of the Greek orthography as being 95.1% in the direction of grapheme to phoneme (reading) and 80.3% in the direction of phoneme to grapheme (spelling).

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V. GENERAL DISCUSSION

The goal of studying the predictors of emergent literacy and reading skills is to better understand the factors that influence these skills. By knowing what factors influence which skills, parents and educators can focus on those factors that will make the biggest impact on their child's reading ability, and individualized preventive programs can be put in place to target specific skills in order to meet each child's needs. Understanding the predictors of emergent literacy and reading skills has theoretical implications as well. In terms of theory we need to know if the predictors of emergent literacy and reading skills are the same across languages differing in orthographic consistency so that we know if it is appropriate to generalize models of reading development across languages.

Over the past decade researchers have developed a better understanding of the emergent literacy skills that predict reading achievement. Among the emergent literacy skills, letter knowledge and phonological processing, particularly phonological sensitivity and naming speed, have been shown to be good predictors of reading acquisition (Bishop, 2003; Schatschneider, Fletcher, Francis, Carlson, & Foorman, 2004). Other factors have also been shown to predict reading achievement, including shared book reading (Bus, van IJzendoorn, & Pellegrini, 1995), parents' beliefs and expectations (Entwisle & Hayduk, 1988), and children's task-focused behaviours (Aunola, Nurmi, Niemi, Lerkkanen, & Puttonen, 2002; Hagtvet, 2000). Despite the knowledge of the importance of emergent literacy skills, environmental factors, and behavioural factors for reading development, there are significant unresolved issues, such as: (a) How

important is shared-book reading to language, emergent literacy, and reading development? (b) What is the contribution of environmental and behavioural factors on emergent literacy and reading skills when they are simultaneously examined? and (c) Do environmental and behavioural factors contribute to the development of reading equally for two languages that vary in orthographic consistency? The purpose of this dissertation was to address some of these unresolved issues by examining the predictors of emergent literacy and reading skills within and across languages, concurrently and longitudinally, and in the presence of other known correlates of reading acquisition.

This chapter first presents a summary of each of the papers of the dissertation as well as limitations of each study. The findings of the studies are then discussed in light of Sénéchal and her colleagues (Sénéchal 2006; Sénéchal & LeFevre, 2002; Sénéchal, LeFevre, Thomas, & Daley, 1998) Home Literacy Model (HLM). The chapter concludes with recommendations for future research and suggestions for parents.

Shared Book Reading, Language, Emergent Literacy, and Reading Skills

One predictor of emergent literacy and reading skills that has been studied extensively is shared book reading. The authors of a review (Scarborough & Dobrich, 1994) and a meta-analysis (Bus et al., 1995) of parent-preschooler shared book reading studies conducted about fifteen years ago concluded that, overall, parent-preschooler shared book reading explains about eight percent of the variance in a combined measure of language, emergent literacy, and reading achievement. The authors, however, drew different conclusions regarding the

overall importance of shared book reading and whether shared book reading was more important to language, emergent literacy, or reading skills. Bus et al. (1995) concluded that shared book reading was more strongly associated with language development, whereas Scarborough and Dobrich (1994) concluded that shared book reading was equally associated with emergent literacy skills, reading achievement, and language content knowledge, but not with language structure knowledge (syntactic and phonological abilities). Furthermore, Bus et al. concluded that shared book reading is very important, whereas Scarborough and Dobrich raised doubts about its unique importance for reading acquisition. Lonigan (1994) argued, however, that many of the studies included in the Scarborough and Dobrich's (1994) review suffer from severe methodological or statistical problems. In particular, Lonigan points out a major methodological problem in how shared book reading was measured. Furthermore, Lonigan (1994) argued that the effects of shared book reading on the specific skills that make up the language, emergent literacy, and reading domains were not examined but should be examined because shared book reading is likely more strongly related to some skills than to others. Thus, the purpose of the study presented in Chapter II was to conduct a meta-analysis of the articles published since 1994 in order to determine: (a) the relationship between shared book reading and language, emergent literacy, and reading achievement; and (b) whether different predictors—methodological quality of the study, sample size, socioeconomic status, type of shared book reading measure, age of child at time of outcome measure, or publication year—explain any variance in the relationships between

shared book reading and language, emergent literacy, and reading achievement; and (c) whether shared book reading is related to some aspects of language, emergent literacy, and reading achievement, but not to others.

Regarding the first question, the current analysis found that the overall effect of shared book reading on all of the literacy-language measures combined was $d = 0.54$. Thus, consistent with Bus et al.'s and Scarborough and Dobrich's (1994) overall conclusion, shared book reading explained about seven percent of the variance in all of the literacy-language measures combined. Consistent with Bus et al.'s conclusions but inconsistent with Scarborough and Dobrich's conclusions, the results indicate that overall shared book reading was more strongly associated with the language domain than the emergent literacy domain or the reading domain, although the latter difference was not reliable. The effect size of shared book reading and emergent literacy skills ($d = 0.57$) found in the present study is very similar to the effect size reported in Bus et al.'s study for shared book reading and emergent literacy skills ($d = 0.58$). The effect sizes for shared book reading and language and shared book reading and reading achievement skills ($d = 0.76$, $d = 0.63$, respectively) found in the present study were slightly larger than those reported in Bus et al.'s study ($d = 0.67$, $d = 0.55$, respectively). It is likely that the present meta-analysis is a better indicator of the true effect of shared book reading and language skills since the combined sample size for the language measures in the present study is 1674 compared to 958 in Bus et al.'s meta-analysis. In contrast, Bus et al.'s meta-analysis may be a better indicator of the true effect of shared book reading and reading achievement, as

their combined sample size for reading measures was 2248 compared to 918 in the present meta-analysis.

Of the different predictors that may explain variance in the relations between shared book reading and language, emergent literacy, and reading achievement, the type of measure used to assess shared book reading only made a difference for reading outcomes. Socioeconomic status, sample size, or age of the child when outcomes were measured were not significantly associated with variability in the effect sizes. The methodological quality, whether it was based on the internal, external, or overall validity criteria, was also not associated significantly with the variability in the effect sizes. This lack of significance, however, may have been due to the lack of statistical power as some of the correlations were relatively large. Although methodological quality did not significantly explain variability in the effect sizes, it correlated significantly with the publication year. The more recently an article was published, the better the methodological quality and the smaller the effect sizes found for language and reading achievement. Thus, the idea that improving the methodological flaws of the papers published prior to 1994 might result in larger effects sizes (e.g., Dunning, Manson, & Stewart, 1994; Lonigan 1994; Scarborough & Dobrich, 1994) was not supported by the present findings.

With regards to the second question, the results showed that within the language domain, shared book reading appears to be reliably more related to receptive than to expressive vocabulary. Of the emergent literacy skills, shared book reading was found to be more strongly related to print concepts and letter

knowledge than to listening comprehension and phonological awareness. Of the reading skills, shared book reading was more strongly associated with word identification than with decoding or reading comprehension. These findings leave us with more questions to be answered in future research. First, research should identify if shared book reading is really more related to receptive than expressive language or if findings were affected by the fact that the examined studies measured expressive language when the children were younger than six years of age and it may take longer for shared book reading to affect expressive vocabulary. This effect could only be determined by having future studies measure expressive language when the children are older than six years of age. Second, determining if shared book reading is truly more strongly related with word identification than reading comprehension is another research priority. Only two studies (de Jong & Leseman, 2001; Sénéchal 2006) were used to calculate the reading comprehension effect size and thus more studies are needed to have a better estimate of the relationship between shared book reading and reading comprehension. Third, research should seek to describe the relationship between shared book reading and other emergent literacy skills not examined in the paper, such as naming speed, nonword repetition, name and age writing, word writing-recognition, and orthographic awareness.

A major limitation of the present meta-analysis is that it does not take into consideration whether the effects of shared book reading would be significant after other measures, such as teaching activities, general ability, and attitudes, are taken into account. For example Scarborough and Dobrich (1994) suggested that

in the studies that permitted such comparisons, demographic, attitudinal, and skill differences among preschoolers all made stronger direct contributions to predictions than shared book reading. The study presented in Chapter III tries to address this limitation by simultaneously examining the effects of shared book reading and other environmental and behavioural factors on emergent literacy and reading skills.

Another limitation of the present meta-analysis is that it does not take into consideration how the effects of shared book reading may differ for consistent versus inconsistent orthographies. For example, in a cross-linguistic study conducted by Manolitsis, Georgiou, Stephenson, and Parrila (2009), shared book reading was significantly related to letter knowledge for the English-speaking sample but not for the Greek-speaking sample. More cross-linguistic studies are necessary in order to determine whether shared book reading has the same effect on language, emergent literacy, and reading skills in different orthographies. The study presented in Chapter IV attempts to address part of this limitation by examining the relationship between shared book reading and reading skills in two different orthographies.

How important is shared-book reading to language, emergent literacy, and reading development? Shared book reading explained 12% of the variance in the overall language domain, 8% of the variance in the overall emergent literacy domain, and 9% of the variance in the overall reading domain. Overall, these results suggest that shared book reading does not explain very much variance in the language, emergent literacy, and reading skills especially since other variables

known to predict these skills were not controlled. A major question that remains is whether the variance explained by shared book reading is independent of other variables or shared with other variables. This issue is addressed in Chapter III.

Relations Among Environmental Factors, Behavioural Factors, Emergent Literacy Skills, and Reading Skills

Whereas Chapter II examined the effects of shared book reading on language, emergent literacy, and reading skills, Chapter III simultaneously examined the effects of several environmental and motivational factors on emergent literacy and reading skills. The three questions examined included: (a) Are home literacy, parents' beliefs and expectations, and children's task-focused behaviour uniquely associated with better emergent literacy skills in Kindergarten?; (b) Are home literacy, parents' beliefs and expectations, and children's task-focused behaviour uniquely associated with better word reading accuracy in Kindergarten and Grade 1?; and (c) Are home literacy, parents' beliefs and expectations, and children's task-focused behaviour indirectly associated with word reading in Grade 1 via the emergent literacy skills?

With respect to the first question, the results showed that both direct teaching activities and task-focused behaviour predicted children's letter knowledge skills, and that parents' beliefs about their child's current reading ability predicted phonological sensitivity skills. It is not surprising that parents' reports of their children being directly taught letter names, sounds, and to read words did not significantly predict phonological sensitivity since parents were not asked about activities, such as rhyming, that could be expected to influence

phonological sensitivity. In terms of the second question, the results indicated that both parents' beliefs about their child's current reading ability and children's task-focused behaviour predicted word reading in Kindergarten, but only task-focused behaviour predicted word reading in Grade 1. Direct teaching did not significantly predict wording reading. One possible explanation for this finding is that parents' beliefs about their children's current reading ability and children's task-focused behaviours were more highly correlated with the reading measures than direct teaching was, so once they are accounted for direct teaching does not make a difference. Regarding the third question, the results indicated that task-focused behaviour directly and indirectly predicted significant unique variance in Grade 1 word reading, whereas parents' beliefs were indirectly associated with Grade 1 word reading.

In general, the environmental factors and children's task-focused behaviour explained very little unique variance in the emergent literacy and word reading skills. This finding may not be surprising if only one-fifth of individual variation is due to significant influences from shared environment, as suggested by Byrne et al. (2005). It should be noted, however, that one possible explanation for these findings and Byrne et al.'s findings is the restriction of range in the environmental variables due to a bias toward higher SES groups in both studies. This restriction is one of the limitations of the present study. A second limitation is that a study covering a longer developmental period would be better suited for examining the possible mediating roles and unique contributions each examined factor has on emergent literacy skills and later reading acquisition. It is possible

that some of the environmental factors and task-focused behaviour examined in the current study exerted their influence earlier than when they were measured in this study, and that some other of these variables are influential later in reading development. For example, previous research has shown that shared storybook reading can influence Grade 3 reading comprehension through the child's vocabulary (Sénéchal & LeFevre, 2002). One purpose of the study presented in Chapter IV was to address this limitation by examining the longitudinal effects of environmental and motivational factors on children's Grade 3 reading and spelling skills.

Cross Linguistic Predictors of Reading Skills in Grade 3

Chapter IV of this dissertation sought to extend Chapter III by examining the role of task-focused behaviour and environmental factors on the same English-speaking children's spelling, reading comprehension, and reading fluency in Grade 3. In addition, Chapter IV examines the effects of orthographic consistency and task demand on these relationships by also including a Greek-speaking sample of children. Examining the role of task-focused behaviour and environmental factors on English- and Greek-speaking children's spelling, reading comprehension, and reading fluency is important because we cannot assume that the predictors of reading in an orthographically consistent language will necessarily be the same as predictors of reading in an orthographically inconsistent language. Furthermore, given that the difficulty of the literacy learning task may also vary within a particular language (e.g., Georgiou, Manolitsis, Nurmi, & Parrila, 2010), we cannot assume that the predictors within

a language will be the same for differing literacy tasks (e.g., word reading versus spelling). Thus, the major questions addressed in Chapter IV were: (a) Are home literacy practices and children's task-focused behaviour uniquely associated with better word reading fluency, reading comprehension, and spelling in Grade 3 after controlling for Kindergarten letter knowledge, vocabulary and Grade 1 word-reading fluency? and (b) What are the effects of orthographic consistency and task demands on these relationships?

With respect to the first question, the results replicated previous findings (e.g., Hood, Conlon, & Andrews, 2008; Sénéchal & LeFevre, 2002) indicating that home literacy factors do not directly predict Grade 3 reading or spelling skills for either the English- or Greek-speaking samples. On the other hand, task-focused behaviour directly predicted spelling for the Greek-speaking sample, but not for the English-speaking sample after letter knowledge was controlled. Regarding the second question, vocabulary was more important for reading and spelling in English than in Greek. This finding is in line with a recent study by Nation and Cocksey (2009), where the relationship between vocabulary and reading words aloud was stronger when words contained irregular spelling-sound correspondences. It also makes sense that vocabulary knowledge would be more important when spelling in English than in Greek because fewer words in English can be spelled purely based on phoneme-grapheme correspondences without knowledge of what the word means. Overall, although letter knowledge was important for spelling in English, it was more important for spelling in Greek. Letter knowledge is likely more important for spelling in Greek than in English

because following simple sound-to-letter correspondence rules leads to correct spelling of more than 80 percent of Greek words (Protopapas & Vlachou, in press). Letter knowledge was more important for passage comprehension in English, and task-focused behaviour was similarly important across languages for all tasks. In terms of task demands, task-focused behaviour was more important for spelling and passage comprehension than word reading fluency in both languages, which is consistent with Georgiou et al.'s (2010) argument that spelling and passage comprehension are more demanding tasks than word reading no matter what the orthographic consistency, and they require more effort for an extended period of time.

Some limitations of the study presented in Chapter IV are worth mentioning. As with other cross-linguistic studies, strictly matching tasks in the two languages can be difficult. For the studies in Chapter III and IV, a self-reported questionnaire was sent to the parents to collect information on the Home Literacy Environment (HLE). Higher return rates and less chance of parents inconsistently interpreting questions may be achieved in future studies by interviewing parents over the phone. To decrease a social-desirability bias checklists could be used rather than questionnaires.

Similar to a limitation of Chapter III, there was a relatively small amount of variance accounted for in the Grade 3 reading and spelling outcome measures. This lack of explained variance suggests that there are important predictors of reading acquisition in both languages that were not incorporated in the study. Future studies should include measures, such as rapid naming speed, which has

been shown to be a strong predictor of reading in both orthographically consistent (e.g., *Dutch*: de Jong & van der Leij, 1999; *Finnish*: Lepola, Poskiparta, Laakkonen, & Niemi, 2005; and *German*: Landerl & Wimmer, 2008) and orthographically inconsistent languages (e.g., *English*: Bowers & Swanson, 1991; Compton, 2003; *French*: Plaza & Cohen, 2007). Finally, a larger sample size in both language groups would be desirable. For the type of analyses ran in the study, the sample size was barely adequate. Thus, future studies should strive to replicate these findings with a larger sample size.

Comparing the Present Findings with the Home Literacy Model of Reading

Perhaps the most frequently cited model explaining the role of HLE on reading development is the Home Literacy (HL) model proposed by Sénéchal and her colleagues (Sénéchal 2006; Sénéchal & LeFevre, 2002; Sénéchal et al., 1998). There are three aspects of the model; the first is that children's home experiences with print can be divided into two different and independent types of literacy experiences, the informal and the formal (Sénéchal et al., 1998). Informal literacy experiences are those that expose children to print incidentally through activities such as storybook reading by parents and having books in the home. The formal literacy experiences are those that engage children directly with print through activities such as teaching letters, reading words, or teaching to print their name.

The second aspect of the model, based on Sénéchal and her colleagues' findings (Sénéchal 2006; Sénéchal & LeFevre, 2002; Sénéchal et al., 1998), is that the two types of home literacy experiences are differentially related to language and early literacy skills. The informal literacy experiences are assumed

to promote language skills (i.e., vocabulary), while the formal literacy activities are assumed to promote the development of early reading skills, such as letter knowledge and word reading skills. The model postulates that there is an indirect relationship between home literacy experiences and phonological sensitivity, mediated through the effects of letter knowledge and vocabulary.

The third aspect of the model addresses the longitudinal relations between the home literacy experiences prior to formal reading instruction and eventual reading outcomes. Specifically, the informal literacy experiences are not assumed to contribute to Grade 1 reading skills. They are hypothesized to contribute to reading comprehension skills through their relation to early language. In contrast, the formal literacy experiences are thought to contribute indirectly to reading skills in Grade 1 through their effects on emergent literacy skills, and then Grade 1 reading predicts more advanced reading skills. Sénéchal and her colleagues provide evidence in support of their hypotheses; for example, informal literacy experiences have been found to contribute to reading comprehension in Grade 3 (Sénéchal & LeFevre, 2002) and Grade 4 (Sénéchal, 2006), and their effect was mediated by receptive language skills in Kindergarten. Formal literacy experiences have also been found to indirectly predict reading skills in Grade 1 through Kindergarten emergent literacy skills (Sénéchal 2006; Sénéchal & LeFevre, 2002).

The findings from the studies presented in this dissertation provide only partial support for the HL model. With respect to the first aspect of the HL model, in the studies presented in Chapters III and IV, the informal and formal aspects of

home literacy environment (shared book reading and parent teaching activities) were significantly correlated with each other for both the English- and Greek-speaking samples. This relationship is in contrast to other studies where a weak correlation between the two home literacy factors has been found (e.g., Evans, Shaw, & Bell, 2000; Hood et al., 2008; Sénéchal, 2006). One difference that could possibly explain the difference in findings is that in the present studies, shared book reading and number of books were kept separate in analyses as, surprisingly, they were not significantly correlated. In contrast, teaching activities correlated significantly with number of books in the home, further supporting the idea that in these samples of families the informal and formal experiences were not independent activities in the home. For example, in the study presented in Chapter III, 90% of parents who reported that their children were frequently taught letter names, sounds, or to read words also reported that their children were read to at least once a day. Thus, it is possible that direct teaching takes place during these reading sessions. Alternately, direct teaching activities may take place outside of shared book reading during other activities such as writing (Aram & Levin, 2002). This latter explanation is most plausible given that our questionnaire asked about teaching activities when the child was aged two to four and Evans, Moretti, Shaw, and Fox (2002) showed that more explicit coaching of letter knowledge and word identification occurs from Kindergarten to Grade 1 and from less skilled to more skilled beginner readers. Justice and Ezell (2000) further demonstrated that little print referencing occurs during shared book reading to preschoolers. Thus, teaching activities are more likely occurring

outside of shared book reading, but the two activities are related in that parents in the study who frequently engaged in direct teaching activities also read to their children daily.

The second aspect of the HL model, that two home literacy factors would hold distinct associations with children's literacy and language skills in Kindergarten, was not completely tested in our study as vocabulary was used as a control variable rather than as a dependent variable. In the study presented in Chapter III, it did not make sense to have vocabulary as a dependent variable because it did not correlate significantly with shared book reading or number of books. Thus, the notion that the informal literacy experiences would be related to the children's language skills was not supported by the findings. Similarly, Evans et al. (2000) found that shared-book reading did not correlate significantly with vocabulary. One possible explanation for this is that the range for the shared reading variable in the sample was attenuated, in that nearly all of the children in the sample were read to at least several times per week.

Consistent with the HL model, neither the informal or formal home literacy experiences directly predicted phonological awareness. This result is consistent with previous findings with English-speaking and French-speaking populations (Evans et al., 2000; Sénéchal, 2006). Similarly, in a study with a Greek-speaking sample (Manolitsis et al., 2009) a negative association between phonological sensitivity and parent teaching activities (β = -.25) was found and was interpreted by the authors to mean that rather than teaching activities predicting phonological sensitivity, lower levels of phonological sensitivity

predicted more parent teaching of letters and words. Consistent with part of the second aspect of the HL model, results presented in Chapter III demonstrated that formal literacy experiences (parent teaching) predicted letter knowledge and letter knowledge then predicted Grade 1 word reading.

The present findings contradicted the third aspect of the HL model in regard to the longitudinal relations between home literacy activities and literacy outcomes. The HL model hypothesizes that both types of home literacy activities predict reading and spelling indirectly through the effects of vocabulary and emergent literacy skills (Sénéchal, 2006; Sénéchal & LeFevre, 2002). For mediation to take place, the predictors (i.e., the types of home literacy activities) should independently predict the outcome variables before controlling for the effects of the intervening/mediating variable. Although this relationship was not directly tested, results presented in Chapter IV indicated that neither parent teaching nor shared book reading correlated significantly with Grade 3 reading fluency, comprehension, or spelling in neither the English- nor Greek- speaking samples. One possibility for the difference in the findings is that the reading and spelling measures were from Grade 3 rather than Grade 4.

Taken together, the findings of the studies presented above suggest that for the English-speaking sample the HL model, as introduced by Sénéchal and her colleagues (Sénéchal, 2006; Sénéchal & LeFevre, 2002), holds true only until the end of Grade 1 and only for the formal literacy activities. For the Greek- speaking sample, only the third aspect of the model was tested in the present studies and similar to the English- speaking sample, the home literacy activities were not

related to the Grade 3 reading and spelling measures (see Manolitsis, Georgiou, & Parrila, in press, regarding the other aspects of the HL model). Although partial support for the model was found in the present studies, several limitations of the HL model were also identified.

A major limitation of the model, and the presented research as well, is that studies examining the HL model have been conducted mostly with Canadian children from middle- to upper-middle SES families, as indexed by the parental educational level. It is expected that parental educational level would co-vary with the amount and quality of home literacy activities (e.g., Kirby & Hogan, 2008; Korat, Klein, & Segal-Drori, 2007). Thus, it would be important to study whether the relationships described by the HL model hold when there is greater variation in parental educational level within a single study. At the same time it is also important to examine whether the relationships hold for countries with differing orthographic consistency.

A second major limitation of the HL model and of the studies presented in this dissertation is the assumption that there is a unidirectional relationship between parent teaching, shared book reading, and literacy skills. There is some empirical evidence that the relationship may, in fact, be reciprocal. Kim (2009), for example, demonstrated that children's word and pseudoword reading skills prior to the measurement of home literacy practices were negatively related with parent teaching, such that children who had lower reading scores tended to have parents who reported more frequent teaching at home. Similarly, working with Finnish children, Silinskas, Leppänen, Aunola, Parrila, and Nurmi (2010) found

that the lower the children's academic performance in reading and mathematics at the beginning of Grade 1, the more teaching the parents reported later on. Taken together, the findings of these studies suggest that parents adjust the frequency of their teaching at home depending on the child's literacy achievement. In order to examine reciprocal relationships between parent teaching and literacy skills, future studies should measure home literacy practices on several occasions over time, starting well before formal literacy instruction and continuing well into children's literacy acquisition process.

Conclusions

The findings of the studies presented in this dissertation jointly suggest that developing a model of reading development that includes emergent literacy skills as well as environmental and behavioural factors that takes into consideration orthographic consistency is more complex than any of the prominent models of reading would suggest. Taking into consideration child psychological and behavioural factors as well as environmental factors is a start in the process of achieving a Multiple Systems Model of Reading (Parrila, 2008), but still more interactants could be included, such as genetics and teacher factors. For example, recent research by Taylor, Roehrig, Hensler, Connor, and Schatschneider (2010) indicated that teacher quality affects students' ability to reach their potential. Evans, Fox, Cremaso, and McKinnon (2004) compared teacher beliefs about reading with parents' beliefs and found that they did not match; perhaps another teacher interactant that needs to be explored is how differing parent and teacher beliefs affect students' outcomes. Although the cross-

linguistic multiple systems approach to the research presented in this dissertation is promising, replication of the findings with larger and more varied SES samples and with additional variables, such as RAN, is warranted before definite conclusions can be drawn. More research needs to continue in order to replace less well defined interactants with better defined ones. In the meantime, the present studies suggest that, overall, letter knowledge is the best predictor of early and later reading and spelling in two languages differing in orthographic consistency. Vocabulary knowledge was also an important predictor of word reading fluency and reading comprehension in English. Of the environmental and behavioural factors, task-focused behaviour appears important for spelling skills in Greek and for letter knowledge and early word reading skills in English. This leads to two suggestions: that parents as well as Kindergarten teachers should foster children's letter knowledge and vocabulary by teaching them directly letter names and sounds, as well as meanings of words. Furthermore, as Aunola et al. (2002) have suggested, intervention studies should develop programs that address children's task-focused behaviours and test the impact of the programs on reading and spelling skills in languages differing in orthographic consistency.

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APPENDIX A1

Internal Validity Criteria

Internal Validity Criteria	Definition	Weighting
Measurement		
1. Operationalization of measures	Dependent and independent measures were described in enough detail so that the task demands and underlying variables of interest were evident. A full description of all in house measures is supplied- instructions, number of items per test, choices per item.	2
2. Reliability evidence	Evidence was presented establishing the reliability of measures for participants. For observation measures inter-rater reliability is established.	2
3. Validity evidence	Evidence is inducted, with explicit rationale, from a prior study or test manual that suggests scores are valid for the inferences being made in the study and for the sample population.	2
Statistical Analysis		
1. Sufficiently large N	The number of participants is sufficient for the type of statistical procedures used. For zero-order correlations N > 30. The ratio of subjects to independent variables is acceptable. For multiple regression analyses, the ratio accepted is >10 to 1, and for Anova, 10 subjects per cell is acceptable unless both Ns and variances were unequal.	3
2. Means and standard deviations	All means and standard deviations of independent and dependant variable data were reported.	2
3. Minimum and maximum values	All minimum and maximum values of independent and dependant variable data were reported. Ceiling or floor effects are addressed (e.g., categorizing the variable or leaving it out). If there is no mention of ceiling or floor effects, then enough information is provided to determine whether there are ceiling or floor effects (e.g., test min. and max. as well as the sample min. and max. and std. dev.)	2
4. Discussion of distributional properties	If parametric statistics are used, are the distributional assumptions examined.	2
5. Variances	The adequacy of variance in the measures is discussed. For Anova, the homogeneity of variance assumption is satisfied (the spread of scores between all measures is roughly equal). The rule used is that the largest standard deviation (of independent variables) had to be no more than twice as large as the smallest for the two groups.	2
6. Zero-order correlation	All zero-order correlation coefficients were reported.	2
7. Collinearity	Is collinearity addressed either by reporting low correlations among the independent variables ($r < 0.60$), or by using methods such as hierarchical regression analysis or SEM that are not affected by collinearity.	2
8. Type 1 error controlled	The probability of Type 1 error was controlled. When using multiple t-tests rather than multiple regression analyses or Anova, p values are adjusted appropriately.	3

(continued)

Internal Validity Criteria (continued)

Internal Validity Criteria	Definition	Weighting
9. Extraneous Factors Controlled	Subject variation in factors known to affect target construct are statistically controlled or removed.	
	1. IQ: Some measure of verbal or non-verbal IQ was administered and subject variation in IQ is partia led out, or controlled as a factor. -Age: The affects of subjects' age is controlled via use of standardized scores, or age is entered as a separate variable in regression analysis. -SES or maternal education: When SES/ maternal education varies, it is partialed out, or controlled as a factor.	3
	2. Classroom instruction: is either controlled as a factor, is partialed out, or a comment is made that classroom instruction was similar.	3
	3. Effects due to alphabet knowledge in the case of pre-readers (letter names or sounds) or to prior reading ability in the case of readers are statistically controlled or removed. -Effects due to phonological sensitivity in the case of pre-readers are statistically controlled or removed. -In separate analyses, if subject to variable ratio in regression is permitted, the contribution made by some other variable to reading ability is controlled (e.g., ran, short-term memory)	3
1. Effect sizes	One or more effect size statistics is reported for each study primary outcome, and the effect statistic used is clearly identified.	1

APPENDIX A2

External Validity Criteria

External Validity Criteria	Definition	Weightings
1. Rationale for study/research hypothesis	There was a theoretical or research basis that motivated the questions posed in the study. A well thought out research hypothesis was implicitly or explicitly stated.	2
2. Participant selection	The inclusionary and/or exclusionary criteria for study participation were fully described.	3
3. Participant description	Gender, age, SES, first language, general cognitive ability, and presence of specific learning disabilities were reported.	2
4. Attrition	If attrition rate is high, for a single group greater than 10%, then the pre-test equivalences between those who left and those who stayed needs to be established. If there are two or more groups that are compared, then post-attrition equivalence of the groups needs to be established.	2

APPENDIX B

Parents' Beliefs and Expectations Questions

1. In general, how well do you believe your child reads?

2. Your child finds reading…. very easy ---- very hard

3. To do well in reading your child has to try…. Not at all hard ---- very hard

4. In general, how well do you think your child will do in reading later on in school?

5. In general, how well do you believe your child do at school?

6. Your child finds school…. very easy ---- very hard

7. To do well in school your child has to try…. Not at all hard ---- very hard

8. In general, how well do you think your child will do at school in the future?

Task-Focus versus Task-Avoidance Questions for Teachers:

1. Does the student have a tendency to find something else to do instead of focusing on the task in hand?

2. Does the student actively attempt to solve even difficult situations and tasks?

3. Does the student give up easily?

4. Does the student demonstrate initiative and persistence in his/her activities and tasks?

5. If the activity is not going well, does the student lose his/her focus?