2007

Using Measures of Print to Predict Reading Ability and Children At-Risk for Reading Disabilities in Spanish-Speaking Second Language Learners

Amy K. Grant
Wilfrid Laurier University

Using Measures of Print to predict reading ability and children at-risk for reading disabilities in Spanish-speaking second language learners

by

Amy K. Grant

Bachelor of Science, Mount Allison University, 2005

THESIS

Submitted to the Department of Psychology

in partial fulfillment of the requirements for

Master of Arts

Wilfrid Laurier University

2007

Your file Votre référence
ISBN: 978-0-494-32272-7
Our file Notre référence
ISBN: 978-0-494-32272-7

Abstract

Due to the changing nature of Canadian society, there has been a dramatic increase in the amount of literature focusing on second language reading acquisition. In this particular study, Spanish-speaking students learning English as a second language (L2) were compared to students who speak English as a first language (L1) on various measures of reading ability and specifically on measures of print exposure, which assess extracurricular reading. Past literature on print exposure has found that print exposure questionnaires serve as significant predictors of variance in reading comprehension, word reading, among other variables (e.g., Cunningham & Stanovich, 1993). The current study used 50 L2 learners and 31 L1 learners to compare their performance on various measures of reading. The L2 students were recruited in two waves, one in 2005 and the next in 2006, hereafter referred to as cohorts. Differences were found within the L2 group, where the first cohort of L2 students performed significantly lower than the L1 group on many measures such as receptive vocabulary, word and pseudoword reading, however, the second cohort of students showed scores more similar to the L1 group on many measures. In predicting variance in reading comprehension scores, the title recognition test was a significant, unique predictor even after variables such as receptive vocabulary and nonverbal reasoning were partialled out. However, in the L1 group the title recognition test did not predict unique variance in reading comprehension. Another model was run to predict word reading, and once again the title recognition test was a unique predictor only in the L2 group. Further analyses broke up the L2 group into students with average and poor reading comprehension skills in order to examine the profiles of students who may be at-risk for reading disabilities and found that rapid automatized naming was a significant predictor of reading comprehension in those students with poor reading comprehension skills. Implications will be discussed.

Acknowledgements

Over the past two years I have developed many close friendships and working relationships with various members of the Psychology department here at Wilfrid Laurier University. I would first like to thank my supervisor, Dr. Alexandra Gottardo, for all of her encouragement and support. Even from a distance, she was always only a phone call away and was never absent when I needed help or guidance on an issue. I have had a lot of opportunities, through her, to develop connections with other researchers in the area and extend my research perspectives and knowledge.

I would also like to thank my committee members, Dr. Kim Roberts and Dr. Eileen Wood. You have both given me insightful comments into my MA thesis and have allowed me to think critically about issues and view them from a different perspective.

I would also like to thank the research team here at Wilfrid Laurier, which has involved many members over the last two years, especially to Alana Greco, Adrian Pasquarella, Iuliana Faroga and Leanne Best. Also to all of the researchers at the Ontario Institute for Studies in Education at the University of Toronto, including Dr. Esther Geva who allowed me to stay in her home in order to collect and enter data through their lab.

Last, but not least I would like to thank all of my friends who have listened and helped whenever I needed it. I would especially like to thank Susan Battista, Alana Greco, Tara Dumas, Enoch Landau and Sonja Brubacher for becoming both my colleagues and my close friends over the past two years.

Table of Contents

List of Tables

List of Appendices

Using Measures of Print to predict reading ability and children at-risk for reading disabilities in Spanish-speaking second language learners

Over the course of the last 50 years in Canada, the linguistic picture that has become the norm is that of a multilingual society. Though once considered a bilingual country, the perception is that Canada is changing into a multilingual society where monolinguals are now the minority (Statistics Canada, 2001). One of the consequences of this 'multilingual society' is that educators are being forced to realize that there are indeed differences between children learning multiple languages and children learning one language. These differences are largely misunderstood as many studies have produced incongruent results, for which there are discrepancies between theory and practice as a result. These linguistic differences present additional difficulties for children when learning to read in English as a second language (L2).

The current study intends to explore how potential differences in learning experience in a group of Spanish-speaking L2 learners compare to a group of English as a first language (L1) children in terms of various English reading and reading-related skills. Using native Spanish speakers as a comparison group is interesting due to the differences that exist between the English and Spanish languages. As will be described in more detail later, the Spanish language has a very consistent orthography whereas the English language is very inconsistent in its spelling-sound correspondences (e.g., the unit /t/ and how it sounds in s*t*ar, wri*t*er, eigh*t*h). Specifically this study will examine the role of print exposure (PE), which is an indication of how much a child reads outside of the classroom, on reading comprehension. PE has been explored in 'typical' learners, however, it has not yet been looked at with respect to L2 learners nor has the role that this

variable may have in predicting reading comprehension and other reading-related skills in this group. PE is especially important to examine in the L2 population due to cultural differences that may exist in many families that have recently immigrated to Canada. Our culture places a high value on literacy and pursuing post-secondary education—concepts that may or may not be viewed in the same way in other cultures or countries where only affluent families are given the chance to explore these options. Thus, examining extracurricular reading in these populations may give us some insight into the role that extra-curricular reading can play in these students and how much it helps them learn L2 reading skills. It should be noted, that this study is mostly exploratory in nature due to the fact that the PE measures have not yet been used in this population, and it is unknown as to whether or not the same relationships that were found in L1 groups will emerge in this L2 group.

Two caveats should be noted regarding the results of this study. The L2 students were a convenience sample, as the children who were used in this study had already agreed to participate in a study that began in previous years. In addition, only a small sample of English L1 students could be recruited resulting in unequal sample sizes and possible threats to generalizability.

The following section is broken up into several different subheadings that each contribute important information to understanding the process of reading and the literature behind the development of the current study. In order to understand the nature of second language reading acquisition, the framework behind first language reading acquisition must first be examined. The general concepts that are involved in attaining reading skills will be explained and subsequently the transfer of skills from an L1 to an

L2 will be discussed. The different stages and steps in reading acquisition will be elaborated, with particular emphasis on the transition period that occurs at this time where many students are often diagnosed as having a reading disability. Next, the specific role vocabulary plays in reading will be touched upon, as this is a critical variable in second language reading acquisition. Lastly, literature supporting the important role of extracurricular reading is explained and how this information may be especially important for those learning to read in an L2.

Theoretical Framework of reading acquisition

Most models of reading acquisition have been developed for monolingual English speakers. According to Chall (1996), reading can be broken down into five stages of development—known as Chall's Five Stage Model of Reading development. The first two stages of reading development are referred to as 'learning to read' followed by the next three stages, which are 'reading to learn'. In order for children to learn how to read they must first understand the alphabetic principle, which occurs in the *initial decoding* phase. This knowledge or understanding that letters map onto sounds develops in the first stage of the model. The second stage of reading development involves the increase of *fluency* that is essential to comprehension, and progression from this stage to the *reading for meaning stage,* allows readers to reflect on and comprehend text so that reading becomes a process used to learn information. Speed and accuracy of word recognition become essential prerequisites in order for fluency to be attained. Beginning readers tend to focus a significant amount of time on decoding and understanding specific words, and leave text comprehension out of the picture all together.

Different stages of phonological development occur through the first stage(s) of reading, which lead to the understanding of the alphabetic principle. The ability to recognize, identify and manipulate phonological units within words occurs at various levels throughout this time period (Stanovich, Cunningham & Cramer, 1984). First, children gain awareness at the level of the syllable around the age of three and four. The next stage is onset-rime awareness around the age of four or five, and last but most important in terms of reading is phoneme awareness, which develops when a child gains the ability to read and/or write. Phonological awareness is an important development in the reading process, as it has consistently been found to be related to reading and spelling ability across languages (e.g., Hoien, Lundberg, Stanovich & Bjaalid, 1995). It has also been consistently shown that good phonological awareness is characteristic of good readers and poor phonological awareness is characteristic of poor readers (e.g, Stanovich & Siegel, 1994; Wagner & Torgensen, 1987).

In addition, the language being read can have an impact on the rate of reading acquisition and the degree that different skills are used (e.g., Seymour, Aro & Erskine, 2003; see Ziegler & Goswami, 2005). For bilinguals, it is important to consider the differences that exist between the L1 and L2 languages, as these differences have an impact on the timing of phonological awareness. Ziegler and Goswami describe three constraints thought to influence the reading development of children learning to read in different languages. The first is that of availability, where not all phonological units are accessible prior to learning how to read. The second problem is consistency, where one letter can have multiple pronunciations and the same phonological unit can have different spellings. The last problem described by the authors is that of granularity. Granularity

reflects how there are different units that range in size. For example, the fact that there are more words than syllables, more syllables than rimes, more rimes than graphemes and more graphemes than there are letters. This concept is explained in terms of orthography, which is the written representation of sounds. When a language has many orthographic units to learn (e.g., t, th, c, ch, etc.) it is more difficult to learn the phonological units, as there are so many variations in pronunciation. Languages with more orthographic units are described as languages that have larger grain sizes. When a language has fewer spelling to sound correspondences, it is thought to have smaller grain sizes. Therefore, the more consistent the orthography, that is the fewer grapheme to phoneme correspondences there are, the easier it is to learn the phonology of the language.

Spanish and English provide a contrast in their grain sizes due to differences in the consistency of their orthographies. When a letter consistently maps onto one sound and one spelling (e.g., Spanish), it should be easier to learn how to read and thus learn aspects of phonological awareness more quickly than in a language where one letter can have multiple pronunciations and spellings (e.g., English). Evidence of faster reading acquisition in Spanish comes from Goswami, Gombert and de Barrera (1998) who looked at L1 pseudoword reading ability of English, French, and Spanish in 7-, 8-, and 9-year-old children. They found that in reading pseudowords, English seven-year-olds decoded 12% of the nonwords accurately while Spanish-speaking children (matched on reading level of their L1) decoded 94% of the words accurately. French-speaking children fell somewhere in between, where they decoded 53% of the nonwords accurately. Similar results documenting the slow rate of reading acquisition in English have been noted (Seymour et al., 2003). Due to the consistency of the Spanish orthography, Spanish-

speaking children should also develop phonological awareness more quickly. In order to read these nonwords, the readers had to be aware of the grapheme-phoneme correspondences, which meant that they would have had to obtain adequate phonological awareness skills. Therefore, the differences that emerge in reading nonwords in English and Spanish are related to the phonological awareness skills of these speakers.

Language skill transfer from L1 to an L2

When children are learning a second language, and learning to read in that second language, it is important to consider the transfer of skills from a child's L1 to their L2. Basic literacy skills have been found to develop in similar ways in L1 and L2 populations (e.g., Chiappe, Siegel & Wade-Woolley, 2002). One study conducted by Manis, Lindsey and Bailey (2004) found that there was cross-language transfer of skills from Spanish to English. Print knowledge, phonological awareness and rapid automatic naming (RAN) measured in first grade were found to be cross-language predictors of second-grade reading. In addition, Geva, Yaghoub-Zadeh and Schuster (2000) found that L1 and L2 reading skills are positively correlated and differences in the development of these skills can be predicted on the basis of underlying cognitive and linguistic abilities (e.g, phonological processing, working memory, rapid automatized naming, and orthographic knowledge). These important skills, as mentioned, play a similar role in the acquisition of L1 and L2 reading skills.

There have been several other studies that have also found cross-language transfer of phonological awareness (Gottardo, Yan, Siegel & Wade-Woolley, 2001; Lindsey, Manis & Bailey, 2003) and reading comprehension (e.g., Lindsey et al., 2003). That is, if a child has proficient skills in terms of phonological awareness and reading

comprehension in their L1, these skills transfer to learning their L2 and thus the L2 is acquired more efficiently. This finding also has important practical implications to consider, because if a child has not yet gained proficiency in their L1 they may not be reading in their L1 outside of school, and thus it is presumed that they are even less likely to be reading in their L2 outside of school.

Gholamain and Geva (1997) also published interesting results with respect to acquiring skills in two languages. The sample consisted of a group of Iranian children, learning to read in Farsi, their native language, one day a week at a school. Even though these children attended school in English five days a week, it was found that there was similar growth in word reading abilities in both languages. Initially, the children had better English word reading skills. Children were not taught all of the sound-symbol correspondences in Farsi until the third grade, but once they did learn these relationships, their ability to read words in Farsi greatly improved and met the level at which they could read English words. This finding illustrates differences in orthographic depth nicely, as children were able to catch up to word reading abilities in English due to the fact that Farsi's orthography is not as "deep" as English orthography. Therefore, there are different developmental trajectories associated with accurate decoding in shallow orthographies, where the growth is less steep in other languages compared to English. Similar relationships would be expected in languages such as Spanish, due to the consistency in their orthography.

The majority of this research has assumed that acquiring more than one language relies on the same cognitive processes (Geva, 1999), despite knowledge that acquiring two languages at different times results in separate regions of the brain devoted to the

processing of these two languages (Gandour et al., 2007). Based on this knowledge, Geva states that we cannot assume that different cognitive precursors to successful reading skills carry the same weight across different languages that have different orthographies (also see Geva & Siegel, 2000).

Transition to 'Reading to learn'

In terms of the transition from 'learning to read' to 'reading to learn', this typically occurs around grade three or when a child is around the age of eight-years-old. According to Chall (1996), children acquire vocabulary and background information when they enter this third stage of the reading model in the 'reading to learn' phase. This is an important stage in reading development, as this period is when children with reading problems are usually diagnosed or recognized as having a reading disability. The delay is due to criteria used by many school boards for the assessment and diagnosis of a reading disability. For example, there are two criteria still used by professionals in this assessment process. One of these criteria includes a two-year delay in academic achievement and the other includes a discrepancy between ability and achievement (Fiedorowicz et al., 2001; see Appendix 4). A learning disability is characterized by problems that may affect the acquisition, organization, retention, understanding or use of verbal or nonverbal information in children who show at least average abilities for thinking or reasoning. Learning disabilities specific to reading can result in impairments related to decoding, phonetic knowledge, word recognition and comprehension (Fiedorowicz et al., 2001; see Appendix 3). Children who meet the criteria used for assessment have not yet gained fluency in their reading, and thus their reading comprehension can lag behind that of the other children who are in the same grade but

reading at a much higher level. This transfer to 'reading to learn' is also an important time in the reading development of L2 learners, as this is when they are often misdiagnosed as having a reading disability. It is also the case that the difficulties an L2 learner has in reading are attributed to difficulties in learning a second language.

In order for children to advance to later stages of reading development, especially reading comprehension associated with "reading to learn", sufficient background knowledge and vocabulary must be attained in both their L1 and L2. This background knowledge and vocabulary is often obtained by exposure to reading, thus PE. Although the source of their difficulties is fundamentally different, a comparison group that might be similar to an L2 group in terms of exposure to English texts is students with reading disabilities. Skills such as background knowledge and increases in vocabulary develop at a later stage in children with reading disabilities, as at this point in their reading development they still do not have fluency in their reading. They do not have the opportunity to build these skills due to decreased practice in reading. A similar picture emerges for L2 readers as well, and because vocabulary knowledge serves as an informational base that allows readers to advance their reading development and acquire adequate reading comprehension skills, both of these groups are lagging behind their peers at this critical stage.

Vocabulary development

Vocabulary development has also been found to mediate higher-level comprehension skills such as grammatical knowledge (Chall, 1987). When vocabulary knowledge is sufficiently delayed, it disrupts reading comprehension as the proportion of unknown words in text increases (Carver, 1994). L2 learners have been found to be

behind their age-matched peers in terms of both vocabulary development and reading level (e.g., August, Carlo, Dressler & Snow, 1999), and as a result of this delay are often misdiagnosed as having reading disabilities due to these deficiencies in their learning. One important aspect of studying and comparing L1 and L2 populations is to understand why and what differences exist in the reading skills of these students, so that proper assessments can be made of their reading or language problems.

Further research on vocabulary acquisition shows that there are specific differences in the vocabulary knowledge of L2 learners. Specifically, breadth of vocabulary—as assessed by the number of words known, and depth of vocabulary—the richness of the word representation are two terms typically used to describe differences in vocabulary knowledge. L2 groups have been identified as being less proficient in depth of vocabulary knowledge (e.g., Feldman & Healy, 1998; Ordonez, Carlo, Snow & McLaughlin, 2002). Additionally, in a model testing L2 reading comprehension, vocabulary knowledge was especially important for improved reading comprehension outcomes (Proctor, Carlo, August & Snow, 2005).

Reading for pleasure—Print Exposure

As previously mentioned struggling students display their deficits by reading text at a slower rate, therefore, reading fewer words per minute than their peers and making more errors. Both children with reading disabilities and children attending school in their L2 are behind their peers in age-appropriate reading skills for different yet still unfavorable reasons. Without being able to learn the basics, reading for enjoyment is unlikely. This lack of enjoyment results in even less time given to learning to read, which means that there will be less time devoted to practicing word recognition and other

reading skills. The amount of extra-curricular time a child spends reading is often an effective means of differentiating good readers from poor readers (Chard, Vaughn & Tyler, 2002).

There are two domains of literature concerning extracurricular reading. One of these domains is referred to as storybook reading and involves exposure to literacy in preschool or at home. This type of reading though is not self-directed reading, but concerns parents or caregivers reading to their children. Although the current study primarily involves children's self-directed extra-curricular reading, the ability to perform well on PE questionnaires can also be influenced by prior literacy exposure and experiences. This body of literature has developed a model referred to as the Home Literacy Model, which states that there are two distinct types of experiences—storybook exposure and parent teaching about literacy (see Senechal & LeFevre, 2002 for a review). Storybook exposure, or parents reading stories to their children, is related to the development of language skills (specifically vocabulary), whereas parent teaching about literacy is directly related to the development of early literacy skills. The specific impact of storybook exposure is important to consider, as it shows that parents reading to children early on does not have a direct impact on literacy skills, but does have an impact on vocabulary, which is especially important to consider in the L2 population. Although, more directly related to the current study is that storybook reading was found to be related to the frequency with which children report reading for pleasure even after parent education and alphabet knowledge were controlled in a L2 group (Senechal, 2006).

There has been a recent increase in research on the relations between PE and reading skills. PE is thought to be one's general exposure to different literacy materials

outside of the classroom. Measures of PE, developed by Stanovich and West (1989), serve to obtain a measure of how much a student reads materials that are not directly related to schoolwork. These researchers initially developed two questionnaires that would be used as more valid and reliable measures of exposure to print. The author recognition test contains a series of authors that children are to check off if they recognize them, mixed in with a series of foils that are placed within the questionnaire to reduce social desirability and to detect guessing. They also developed a title recognition questionnaire that lists both real and made up book titles. Previous research on extracurricular reading used daily activity diaries to document reading as opposed to the current use of PE measures in these studies. These measures, used in previous studies by Stanovich and colleagues, have been checked for convergent validity with diary studies (Allen, Cipielewski & Stanovich, 1992). These researchers also found that the PE measures could predict reading behaviour in natural settings (West, Stanovich & Mitchell, 1993).

Later, they revised and adapted these questionnaires to be used in different samples such as adults and high school students (Stanovich & Cunningham, 1993; Stanovich, West & Harrison, 1995). In adapting these questionnaires they added and changed the genre of authors used, and also used a magazine recognition questionnaire instead of title recognition in these older learners. The majority of this research however, has focused on school-aged children who are 'normal' readers (e.g., Cunningham & Stanovich, 1997; Echols, West, Stanovich & Zehr, 1996).

Echols, West, Stanovich and Zehr (1996) conducted a two-year longitudinal study, which evaluated the use of two measures of PE. The Title Recognition Test (TRT;

Stanovich & West, 1989) and the Author Recognition Test (ART; Stanovich & West, 1989) were used on a sample of monolingual fourth-, fifth-, and sixth-grade children to determine their relationship to several measures of literacy. They found that these two measures of exposure to print did predict growth in receptive vocabulary, general information, spelling, sight vocabulary, verbal fluency and reading comprehension. However, out of the two tests, the ART was not as useful a predictor as the TRT.

Cunningham and Stanovich (1997) carried out a ten-year longitudinal study on a group of 1st graders. In grade one, these students were tested for reading ability and cognitive ability. When these students reached grade 11, they were given measures of exposure to print, reading comprehension, vocabulary and general knowledge. The authors found that reading ability in 1st grade predicted a significant amount of variance in 11th grade PE, which combined scores from the ART and Magazine recognition test (MRT). This finding shows that early reading ability is related to how much students will be engaged in print in the later years. It also suggests that student's early acquisition of reading, regardless of the student's ability in 11th grade, predicts that they will be more likely to engage in reading activity in the later grades. PE accounted for a significant amount of the variance in comprehension ability (10.2%), and also in vocabulary (44.8%), in the 11th grade. As well, significant correlations were found between PE and Nelson-Denny reading comprehension, two measures of vocabulary (Nelson-Denny and Peabody Picture Vocabulary Test) and four measures of general knowledge (Cultural Literacy Test, History & Literature, Multicultural Checklist, and Cultural Knowledge Checklist).

Similar results have been repeated for college samples. Although, this research differed in its objectives, researchers found that general ability and television exposure accounted for a significant percentage of the variance in general knowledge (Hall, Chiarello & Edmondson, 1996). It is important to understand in this case, what general ability is so that the role of television exposure can be understood. General ability is used as a measure of one's general intellectual ability as assessed through tests of nonverbal reasoning (e.g., using logic and reasoning to solve problems involving abstract designs and shapes). These tests minimize the effects of language, culture and educational knowledge. The purpose of the Hall et al. study was to expand on that done by Stanovich and Cunningham (1993), which concluded that measures of PE predicted individual differences in general knowledge. The Stanovich et al. (1993) study found that a combined PE score using the ART and the MRT accounted for 37.1% of the variance in general knowledge on top of other variables, such as reading comprehension, High school GPA and a general ability measure from the Raven Advanced Progressive Matrices test. They did not find that television exposure accounted for any additional variance in general knowledge when entered with these other factors. Hall et al. (1996) found a stronger relationship than Stanovich and Cunningham, concerning the finding that general ability and television exposure accounted for significant variance in general knowledge. General ability accounted for 46.6% of unique variance in general knowledge, whereas television preference accounted for 20.0% of variance in general knowledge. They further suggested that educational television may increase literacy, whereas, non-educational television may limit literacy.

Research has also shown that PE plays an important role in knowledge growth and maintenance across the lifespan, showing the utility of such a measure in determining its relation to literacy in younger readers. College students (mean age = 19.1 years) and older individuals (mean age = 79.9 years) were compared on measures of literacy skills, general knowledge, and levels of PE at the time of testing (Stanovich, West & Harrison, 1995). Exposure to print was a significant predictor of vocabulary and declarative knowledge in both groups when all other measures such as educational level and general ability were controlled. Older participants showed a stronger preference for reading on the Activity Preference Questionnaire (APQ). College students preferred reading about 1 ½ times more than the other activities, whereas older participants preferred reading about 4 times over other activities. Although the two groups performed equally on overall scores of the ART and MRT, there were large reported individual differences. Older participants seemed to be more familiar with non-fiction writers, where college students were more familiar with fiction writers.

Generally, research using the APQ has shown that a preference for reading has a positive correlation with reading-related skills such as vocabulary (Stanovich et al., 1995). On the other hand, the APQ preference for watching television tends to have negative correlations with things such as High School grade point average, and PE measures. It is important to assess the impact of television and reading preference in relation to the PE measure as an Activity Preference Questionnaire will be used in the current study that evaluates children's preferences for watching television or reading. These will be further variables in explaining potential differences between L1 and L2 learners and their exposure to literacy and reading.

Given the relationship of PE to various reading skills in normal learners, the question arises as to what occurs in atypical learners, such as L2 learners or those with reading disabilities. There have been few studies that examine how PE may be related to literacy skills in these populations. McBride-Chang et al. (1993) compared those with reading disabilities (N=36) and typical readers (N=49) in grade 5-9 students. The TRT served as a useful predictor of reading comprehension as a measure of PE for those with reading disabilities. This measure also explained a significant amount of variance after word identification, vocabulary and metacognition had been entered as factors. The researchers suggested that because those with reading disabilities tend to read less, partly because of insufficient decoding and fluency skills, the lack of exposure to print may cause further cognitive deficits. They also suggest that this may be partly due to Matthew effects, where those rich in print knowledge become richer (Stanovich, 1986). For non-disabled readers, the TRT was also a significant predictor of reading comprehension. However, it did not remain significant once other predictors such as higher-level cognitive processes were taken into account. Therefore, high PE seems to be especially beneficial for students with reading disabilities. Children selected for the disabled sample scored at the 25th percentile or below on the Woodcock Reading Mastery Test (Woodcock, 1987), and exhibited a discrepancy between IQ and reading achievement. However, students without reading disabilities scored above the 25th percentile on the same battery of tests used for selection. The mean percentile rank for the non-disabled readers on this test was 62.9 (range = 28.0 to 97.0%). Therefore, the selection of this group was not very stringent and does not serve as a good comparison to the group of

students with reading disabilities as it contains both highly skilled and lower skilled readers.

At-risk status

In studying those learning an L2, and in determining who is at-risk for reading disabilities in these populations, it is important to evaluate the differences that exist between L2 populations and those with reading disabilities. One study analyzed the cognitive differences between native Spanish speakers learning English as an L2, and children with reading disabilities, to determine whether problems in L2 acquisition and problems that underlie reading disabilities are similar (Swanson, Saez, Gerber & Leafstedt, 2004). They found that there is a language-specific working memory factor that predicts performance on English reading measures such as word and pseudoword identification. There was also found to be a language-independent (of phonological processing) working memory factor that predicted performance on vocabulary measures. The results of this study show that those at-risk for reading disabilities experienced problems in a language-specific system, which means that phonological processing is a major factor in the problems in reading acquisition. However, the language-independent factor, which predicts vocabulary, is more important in explaining second-language acquisition in reading. That is, the short-term memory or phonological system operates independently of working memory, whereas in the case of children at-risk for reading disabilities, these two systems are related. This finding can be used to start developing more accurate assessment techniques in separating out those at-risk for reading disabilities and those who are having difficulties related to their L2 acquisition.

Summary

In summary, past literature on reading development has shown that L2 learners can be improperly diagnosed as having a reading disability due to discrepancies between criteria used for assessment and differences that exist between L1 and L2 populations. In addition, several studies have shown that there is indeed a strong relationship between PE and reading comprehension in English-speaking populations, however, this relationship has yet to be looked at in L2 populations. Specific variables in addition to PE will be examined in their potential relation to reading comprehension and word reading based on past literature showing the relationships between these variables. For example, phonological processing has been shown to be related to reading development in L1 learners (see Siegel, 1993 for a review). This variable will thus be used in the present study to determine whether this relationship holds true in predicting differences in word reading ability in L2 learners before variables such as PE are entered. In addition, vocabulary is a variable that is important in reading acquisition, and is often used to predict differences in reading comprehension due to the role vocabulary plays in the comprehension of text (Oulette, 2006).

The study explored specific factors related to reading skill in second language learners through a two-year longitudinal study of second and third graders, a time-period in which a critical development in a child's reading occurs. The study included the use of cognitive-linguistic factors such as oral language proficiency and phonological processing to determine factors related to reading comprehension and reading vocabulary. The first step in this study was to determine the differential role PE had in accounting for variance in reading comprehension between the first-language (L1;

English) and Spanish-speaking L2 learners. It was expected that more variance in reading comprehension would be explained in the L2 group, as these children needed more exposure to written English in order to be able to succeed in learning to read in that second language. The second main part of the study was to examine which factors could differentiate good from poor comprehenders within the L2 group, and to determine the role of PE in these two groups as well.

Method

Participants

Sixty-three Spanish-speaking second language learners (32 boys and 31 girls), learning English as a second language, were recruited from Toronto-area school boards. These students were recruited as part of larger longitudinal research study that began when the children were in senior kindergarten, and were recruited in two waves. The 1st wave of students were in grade 2 in 2005 (12 males, 14 females; mean age = 92.3 months) and were followed into grade three (mean age = 106.0 months). The 2nd wave of students were in grade 2 in 2006 (10 males, 14 females; mean age = 92.6 months) and were followed into grade 3 as well (mean age = 104.2 months). This resulted in 50 students with both grade 2 and 3 longitudinal data. As it is important in understanding the subsequent analyses, the L2 speaker's data was analyzed separately for each wave of recruitment, with the first wave being hereafter referred to as the first cohort and the second wave of testing being referred to as the second cohort.

Thirty-one students who speak English as a first language were recruited in one wave of recruitment in 2007. This resulted in 13 students who were in grade 2 (6 males, 7 females; mean age = 93.4 months), and 18 students who were in grade 3 (10 males, 8

females; mean age = 103.6 months). These students serve as a control group in the current study to determine how the ESL students compared to normally developing English L1 children. Approximately 175 consent forms were distributed to six schools in the Waterloo region. Teachers were instructed to hand forms out to eligible students, requiring that the students were English as a first language students, and who did not suffer from any known significant cognitive impairments. Of these forms, 35 were returned, resulting in a 20% return rate.

Due to the nature of the current research, it is especially important to consider the role of the community in the development of children's education and development both before and during a child's school career. Efforts were made to recruit students from similar neighborhoods in terms of socioeconomic status and diversity. However, this data was not collected in the current study and thus inferences cannot be directly made in terms of the role this may have played in recruiting the L1 and L2 group from different areas.

Materials

Fourteen standardized and five non-standardized measures, all administered in English, were used in the present study. The tests measured several constructs such as oral language proficiency, measures of reading, PE, and higher-level comprehension skills that are related to reading.

Cognitive factor: Nonverbal reasoning

Matrix Analogies Test (MAT-Expanded Form; Naglieri, 1989). This test involved four subtests related to reasoning and problem solving. The first is Pattern Completion, whereby the participant is asked to choose from one of the six pictures below in order to

complete the pattern above. The other three tests are: Reasoning by Analogy, Serial Reasoning, and Spatial Visualization. They all involved the same concept as the first subtest. This test was used as a measure of general nonverbal intelligence in order to differentiate between children who may be at-risk for reading disabilities from those who show a cognitive delay. Reported reliabilities from the norms for English-speaking children at age seven are .94, age eight are .93, age nine are .92, age ten are .91 (Naglieri, 1989).

Reading Measures

Woodcock Reading Mastery Test-Revised (WRMT-R; Woodcock, 1987). Several tests of both word and pseudoword reading were administered to both language groups at time one of testing for the English speaking students and both time one and time two of testing for the ESL students. The Word Identification subtest involves reading as many words as possible before reaching a ceiling of reading six consecutive words read incorrectly. The words begin at an easy level (e.g., *is, you, and*) and get progressively harder throughout the task (e.g., *torpedo, almanac, oenology).* The Word Attack subtest, a measure of pseudoword reading, revolves around the same concept as the real word reading, and it also involves items that get progressively more difficult throughout the task (e.g., *dee, ift, zirdn't, vauge, gnouthe*). Reported reliabilities from the norms for English-speaking children for the pseudoword reading task at ages six and seven are .95, and at age nine are .91 (Woodcock, 1987). For the word reading task, reported reliabilities for children at age six are .96, and at age nine are .94 (Woodcock, 1987). A sample of Spanish-speakers yielded a similar reliability for the two subtests, alpha = .89 (Francis, Snow, August, Carlson, Miller & Iglesias, 2006).

Test of Word Reading Efficiency (TOWRE; Wagner, Torgensen &Rashotte, 1999). This test involves reading lists of both words and pseudowords as rapidly as possible, which measures reading fluency. Students' progress was marked at time points of both 45 and 90 seconds, however, standardized scores are calculated based on the number of words read correctly at the 45 second cutoff. If a student finished reading the list, the total time it took the individual to read the list was recorded. Reported reliabilities from the norms for English-speaking children at age seven are .97, age eight are .95, age nine are .93, and age ten are .95 (Torgensen & Rashotte, 1999).

Woodcock Language Proficiency Battery-Revised (WLPB-R; Woodcock, 1991). The passage comprehension subtest of this battery of tests was used to assess reading comprehension of students in grade two. This test involves reading passages silently. The children are first instructed to pick a picture that matches the appropriate stimuli words, and are then told to fill a missing word into sentences presented in increasing order of difficulty. Testing is discontinued once the child has missed or provided the incorrect word for six consecutive sentences. Reported reliabilities for English-speaking norms are .95 for age six and .88 for age nine (Woodcock, 1991). In a sample of Spanish-speakers the reliability was slightly lower but still acceptable, alpha = .81 (Francis et al., 2006).

Neale analysis of Reading Ability (Neale, 1989). This test was used as it provides a measure of reading comprehension, word reading and reading fluency through one test. This test involves reading aloud a series of short passages, for which comprehension questions follow. For each passage children were timed, which gave a measures of reading fluency. Errors made in reading text were also recorded in order to analyze word reading ability. Reading comprehension scores were based on the number of questions

answered correctly for each passage read. These different measures of reading skill are useful as each gives a different picture of what skills the child is proficient in, and what skills the child is behind in. Reported reliabilities for the accuracy score from the norms for English-speaking children at age 6-7;11 are .92, and age 8-9;11 are .90 (Neale, 1989). Reported reliabilities for the comprehension score at age 6-7;11 are .87, and age 8-9;11 are .85 (Neale, 1989). Reported reliabilities for the reading rate score at age 6-7;11 are .58, and for age 8-9;11 are .71 (Neale, 1989).

Phonological Processing

Phonemic awareness. This experimental measure involves three parts, the first of which involves syllable awareness (e.g., say 'bamdaw', now say bamdaw without saying 'bam'). The next part of the test involves deleting phonemes at the level of the onset or rime (e.g, say 'vock' without /v/). The last part of the test, which is the only part of the test that was used with third graders, involved deleting phonemes within the onset or rime (e.g., say 'bip' without /p/). There are no current reported reliabilities for this test.

Rapid Automatized Naming (RAN; Wagner, Torgensen & Rashotte, 1999). Two tests from the Comprehensive Test of Phonological Processing (CTOPP) were used, which involve reading a list of numbers or letters as fast as possible, making as few mistakes as possible. This test is associated with the fluency of retrieval of verbal labels, which is related to word reading proficiency. The more efficient or automatic a reader is in retrieving these cues, the more attention is freed to focus on comprehension of text. This test has been found to be strongly associated with predicting students at-risk for reading disabilities in L1 populations (Stanovich & Siegel, 1994). Reported reliabilities

from the norms for English-speaking children at age eight are .80 for the digit naming, and are .72 for the letter naming task (Wagner, Torgensen & Rashotte, 1999).

Oral Language proficiency

Peabody Picture Vocabulary Test (PPVT III; Dunn & Dunn, 1981). Form B of this test was used to measure receptive vocabulary knowledge. Each participant is presented with four pictures at a time and they are to point to the picture they think represents the word being given to them orally. As the test progresses, the words become increasingly difficult and testing is discontinued once a participant has made eight or more errors in correctly identifying a picture matching a word being given to them by the examiner. Reported reliabilities for age seven and eight are .95, and age nine are ten are .96 (Dunn & Dunn, 1981).

Oral vocabulary subtest of the woodcock language proficiency battery revised (WLPB-R, Woodcock, 1991). This vocabulary task measures the ability to generate antonyms or synonyms of words given by the examiner. This measure was used in addition to the PPVT-III as the tests measure different skills, where the PPVT-III measures receptive vocabulary and the WLPB requires the child to reflect on the meaning of a word and then provide another word that means to same thing or the opposite. There are two different aspects of vocabulary that are important to consider. Breadth of vocabulary is described as being the number of words known and is more likely related to the PPVT-III (Ordonez et al., 2002). However, depth of vocabulary refers to various aspects of the use and meaning of the word and is more likely to be related to the WLPB-R oral vocabulary subtest (see Snow & Locke, 2001). Using more than one measure for vocabulary allows us to more closely examine what differences exist between L1 and L2

populations. Reported reliabilities from the norms for English-speaking children at age six are .87, and at age nine are .86 (Woodcock, 1991). In a sample of Spanish-speakers the reliability was slightly lower but still acceptable, alpha = .81 (Francis et al., 2006).

Working memory. Two tasks were used to measure working memory in this study, one of which is an adaptation of a Daneman and Carpenter (1980) task (Gottardo, Stanovich & Siegel, 1996). The participants were required to listen to a series of true/false statements, and were then instructed to recall the last word in each sentence that they heard. These sentences are presented in order of increasing difficulty in sets of two, three, or four sentences. There are no current reported reliabilities for this experimental measure. The second test of working memory that was used in grades three and four was the backward digit span task of the WISC-III (Weschler, 1991). In this task, students were instructed to recall digits in reverse order starting from 2 digits to a maximum of recalling eight digits in reverse order.

Background knowledge and reading experience

World Knowledge. An indirect measure of this construct was taken using the Similarities subtest of the WISC-III. This test asks students a series of questions related to how two things are similar (e.g., "In what way are an apple and a banana similar?").

Print Exposure

Three measures were used to assess print exposure. PE is a variable that helps to determine the relationship between word reading and reading comprehension. These two tests are well-known, valid and reliable measures that have been used to consistently predict reading experience (see Allen et al., 1992; Cunningham & Stanovich; West et al.,

1993 for reliability and validity data). Past measures of reliability have ranged from .86 to .92 (Cronbach's alpha) for various PE questionnaires.

Title Recognition Test. The title recognition test (TRT; Stanovich & West, 1989, see Appendix 2) involves a list of both real titles of popular children's books, and titles that are not real, the latter of which act as foils to detect guessing. Each participant was instructed to check off the names of the books that they recognized to be real titles, and to not guess those that they did not recognize as being 'real'. The test involves a series of 40 titles, 25 of which are 'real' titles, and 15 that serve as foils. The reliability of the number of correct items checked was .88 (Cronbach's alpha).

Author Recognition Test. The author recognition test (ART; Stanovich & West, 1989, revised by Grant & Gottardo, 2006, see Appendix 1) involves a list of real authors and foils, psychology authors or made up names. The foils were used to detect guessing. Each participant was required to check off the names of those authors that they recognized to be real authors. The test involves a series of 52 popular English children's authors, and 47 names, which served as foils. The authors used for this test were selected according to those previously used by Stanovich and West, while adding 27 newer authors and taking away 5 lesser known or older authors who are no longer as familiar in children's literature. The new authors were selected according to lists of popular authors from various websites and by looking at the most common and popular authors at local bookstores.

An additional factor that was considered in this analysis involved adding a line so that children could list any additional authors read at home, which aimed to reduce any culturally specific biases. However, there were only a few children who listed any

additional authors that they knew of that were not listed on the questionnaire. The authors listed were English authors who write popular children's novels, and no children listed any authors' specific to reading in Spanish. The reliability of the number of correct items checked was .95 (Cronbach's alpha).

The typical scoring used on the TRT and ART involves a corrected percentage that takes into account the amount of guessing on the questionnaire. Specifically, this is calculated by taking the percentage of correct items minus the percentage of incorrect items on the task. This is based on analysis previously done by Stanovich and colleagues on past literature involving use of these questionnaires, which was based on the two-high threshold model of recognition performance (Snowgrass & Corwin, 1988). This corrected percentage is then converted to a z-score to be used in subsequent analyses.

Activity Preference Questionnaire (APQ; Stanovich & West, 1989). This questionnaire was used to measure preference for reading and preference for watching television in relation to other activities. It involved a series of 12 questions, 5 of which focused on reading, and 4 of which focused on watching television. Questions were in the following format: "I would rather (a) listen to music of my choice, or (b) watch a television program of my choice." Or, to determine if one had a preference for reading, questions would read as follows: "I would rather: (a) read a book of my choice, or (b) play an outdoor sport of my choice. One of the remaining questions was a forced choice between a preference for reading or watching television, whereby, this question was counted in either category depending upon the participant's choice of activity.
The remaining two questions dealt with optional choices of activities such as listening to music or talking with friends, and did not offer options dealing with watching television

or reading a book. These questions were designed in the original questionnaire to serve as distractor questions as to not give away the purpose of the questionnaire in its entirety. Also important to note is that the presentation of a reading or television preference was counterbalanced between the first and second choice between all questions on the questionnaire.

Procedure

The series of standardized and experimental measures were administered to students in two to three individual testing sessions over a period of maximum two weeks. The total amount of testing time was approximately three to three and a half hours, as it included several other tasks, the results of which will not be reported in this study. These tasks include: Word definitions, CELF (Clinical Evaluation of Language Essentials)-Sentence assembly and Sentence repetition subtests, segmenting words and nonwords from the Comprehensive Test of Phonological Processing (CTOPP), an expressive vocabulary test, and several group tasks, such as word and pseudoword spelling, writing fluency, and several different types of stories measuring different types of reading comprehension (done individually). The tasks varied slightly in the order that they were presented as each student was involved in several individual testing sessions and one group testing session in which they completed the ART, TRT, and APQ questionnaires. The presentation of various tasks were not rigid, but generally involved giving the tests in the order they were presented in the booklets. The order typically proceeded in the following way: receptive vocabulary, word and nonword reading, backwards digit span, test of phonological awareness, reading comprehension test, rapid naming of letters, word and nonword reading fluency, rapid naming of digits, and nonverbal reasoning.

Results

The analyses of the data proceeded in five main steps. First, the mean scores on the main measures of reading were examined in order to compare the mean performance on these tests between the L1 and L2 groups. It is important to interpret these results with some caution as norms for the majority of standardized measures are based on English speaking populations that come from middle-class homes. For this reason, although standardized scores will be reported in the means tables, only raw scores will be used for analysis including regressions and comparisons of means between groups. The second step of the analyses involved examining the correlations between the main variables in these two groups. Third, the data for the Spanish speakers were examined longitudinally in order to understand growth in the skills of these students from grade 2 to grade 3. Fourth, a series of hierarchical multiple regression analyses, using concurrent data collected in grade 3, were carried out in order to understand the specific relationship PE has in predicting and explaining variance in several important component processes such as word identification, vocabulary, and reading comprehension. Lastly, the fifth main step of the analysis involved dividing the group into those with poor and average comprehension skills and examining differences between these two groups. Prior to conducting the analyses, distributions were examined for outliers, and due to this, one participant was deleted from analyses. Participants were not excluded due to deficits in reading skills, however, this one participant was omitted from the analyses due to the requirement that participants should obtain scores broadly within the average range on the intelligence subtests including the WISC-III.

Comparisons of Mean Scores

Some interesting relationships emerged when examining the differences between the three groups (see Table 1 and 2). A one-way Analysis of Variance was used to compare these differences, using Dunnett's T3 post-hoc comparison test for unequal variances and unequal sample sizes among the three groups. Firstly, due to cohort differences between the two waves of testing for the L2 learners, means and standard deviations were analyzed separately, to compare the two cohorts of L2 learners in each grade and the one cohort of L1 learners in each grade. For the grade two measures, there were large differences in receptive vocabulary between the three groups, where the L1 learners outperformed both the L2 groups. The L1 and the second cohort of L2 students performed similarly on many measures, such as word identification, word naming fluency, and passage comprehension. On these tasks, the L1 group and the second L2 cohort outperformed the first cohort of L2 students, on both grade 2 and grade 3 scores. Differences did not emerge, however, on measures such as grade 2 phonological processing, including both Rapid Automatized Naming and phonemic awareness. These differences did emerge in grade 3, however, only at the level of phonemic awareness, where the L1 students performed significantly better than both of the L2 groups. There seems to be a better understanding of phonemic concepts in the L1 students than the L2 students at the grade 3 level. The Grade 3 measures of reading rate did not reveal any differences between groups, although the L1 group had higher scores than the L2 groups on reading accuracy and comprehension. One important difference between these students was differences in nonverbal reasoning as assessed by the Matrix Analogies Test. This difference was taken into account in further analyses between groups.

Correlations between Measures

The results of the intercorrelations of the main variables in each grade, between groups are presented in Table 3 and Table 5. The analyses were conducted separately for the two language groups, L1 and L2, with the L2 learners below the diagonal and the L1 learners above the diagonal. Comparisons can be made between the two groups in terms of the types of relationships that exist between these variables that are all important precursors to successful reading development. Cohort was controlled for in the correlations within the L2 group, and nonverbal reasoning was controlled for in both analyses.

In looking at the correlations that exist between the variables of interest in the L2 group, most of the variables are significantly correlated with each other (Table 3). Word and pseudoword reading were positively correlated with word reading fluency as measured by the TOWRE, $r = .83$ and $r = .70$, respectively. Pseudoword reading fluency was also significantly negatively correlated with rapid automatized naming of both digits, $r = -.54$, and letters, $r = -.62$. The relationships between rapid naming and reading fluency were slightly stronger for pseudoword reading fluency as opposed to word reading fluency, most likely due to the value of the rapid naming measure as an indicator of phonological processing skill and its interesting role as a predictor of students who have reading difficulties. Thus, this relationship was also examined in a regression analysis, to follow. Also interesting was that passage comprehension was correlated with all of the other measures within the table, with the exception of receptive vocabulary, with the correlations ranging between -.64 associated with rapid naming of letters, and .81 associated with word reading fluency.

The differences and similarities that emerge among the correlations associated with the L1 learners also present some interesting evidence (see Table 3). There were far fewer significant or even positive relationships between the variables of interest. There were positive relationships between word identification and word reading fluency, r = .80, and nonword reading fluency, r = .87. There was also a significant relationship between nonword reading fluency and phonological awareness, r = .63. Nonword reading fluency was also associated with passage comprehension, r = .65, although this relationship was stronger between word reading fluency and passage comprehension, r = .73. These relationships reveal expected results, especially due to the nature of the passage comprehension task, where the text becomes increasingly harder and requires fluent reading in order to decode and remember the information in the passage to fill missing words into the sentences provided.

For the L1 group, there were fewer significant relationships among the grade three variables compared to the L2 group. For example, phonological awareness only had significant relationships with word attack, r = .56, reading accuracy as measured by the NEALE, r = .49, and reading comprehension, r = .65. In the L2 group though, phonological awareness was significantly correlated with many more skills that were precursors to skilled reading. Word identification also had highly significant relationships with variables such as word reading fluency, r = .80, and nonword reading fluency, r = .90, results which were similar in the L2 group. Also revealing were the relationships between the PE measures and the other variables, none of which were significant aside from a surprising negative correlation with the working memory task of digits backwards, r = -.52. The author and title recognition test were not correlated for the L1 group,

although they were in the L2 group. These results will be important in explaining several of the regression results presented further on in the present analysis.

Due to the differences that emerged when comparing the mean scores obtained by the two cohorts of L2 students and the L1 group, we further investigated the relationships between these main variables in looking at correlations in the same way L1 and L2 groups were compared. The second cohort of L2 students performed more similarly to the L1 group in terms of mean scores obtained, and the correlations in this group of students were also more similar to the correlations between the L1 students. One differentiating factor seems to be phonological awareness, whereas in the first cohort of L2 students this variable is related to many other variables such as receptive vocabulary, $r = .45$, word identification, $r = .64$, and reading comprehension, $r = .57$. In the second cohort of L2 students as well as the L1 students, phonological awareness was not significantly related to any of the main variables. This difference in the relationship between phonological awareness and the other variables may be different in the two cohorts of L2 students for the same reason it is different between the L1 and L2 groups. This was thought to have occurred because of the lower variance obtained on this measure in the L1 group, the same reason for which may be possible in the second L2 cohort.

Longitudinal growth from Grade 2 to 3

Repeated measures analyses were run to compare the longitudinal growth from Grade 2 to Grade 3 for the L2 students on various important skills related to reading as were measured in the current study. All of the reading variables revealed significant differences between the scores obtained in grade 2 to scores obtained in grade 3. These variables included: receptive vocabulary, word identification, word attack, word and

nonword reading fluency, rapid automatized naming speed (decreased over time), and word and nonword reading fluency.

Despite these differences in raw scores between grades 2 and 3, when comparing several of the variables using standard scores, the picture is slightly different. Once scores were standardized based on expected norms for their age, there was actually a significant difference in skills in the negative direction, towards an age advantage for grade 2's in word, $F(1, 47) = 8.27, p < .01$, and pseudoword reading, $F(1, 47) = 14.93, p < .001$. The word and nonword reading fluency scores did slightly increase though between grades 2 and 3, although these relationships were not significantly different from each other. Standardized scores were used only in this analysis in order to determine whether there were gains relative to age expected norms. Although there were gains in raw scores, as expected, standardized scores must also be compared in this type of analysis in order to understand whether this was actual growth between grades or just simply growth due to increased time in school and age.

One other interesting finding, although not unexpected, was that there was no significant difference between standardized receptive vocabulary scores between the two grades, $F(1, 47) = .17, p = .68$. This is not unexpected, as it is consistent with literature stating that there is a type of 'sensitive period' for vocabulary development, for which after that point it is very difficult to make significant gains in this skill (e.g., Biemiller & Slomin, 2001).

Print Exposure's role in predicting reading skills

Seven hierarchical multiple regression analyses were run in order to examine the differences that may emerge in the extent to which several variables predicted

performance on both reading comprehension and word reading ability for both the L1 and L2 groups. The first regression (see Table 7; see all tables for β values) was carried out using receptive vocabulary and both of the print exposure measures—ART and TRT as predictors of reading comprehension and word reading. Due to the differences that emerged between the two cohorts in the L2 population, we controlled for these differences in the regression analyses by entering cohort first, which did predict a significant amount of variance in the NEALE reading comprehension score, $F(1, 46) = 8.95$, $p = .004$, $R^2 = .16$, adjusted $R^2 = .14$. Additionally, once receptive vocabulary was entered as a factor, this increased the amount of variance accounted for in the model, $F(2, 45) = 24.47$, $p < .001$, R^2 change $= .36$. Particularly important to the goals of the current study was adding the ART and TRT measures of PE. When the PE measures were added, the model remained significant, $F(4, 43) = 17.90$, $p < .001$, R^2 change $= .10$. However, only the TRT added unique variance to the model, while the ART was not a significant contributor. Additionally, when nonverbal reasoning is added to the model (see Table 8), and the ART questionnaire is removed due to previous findings showing that it is not significant, the TRT is still a significant unique predictor of reading comprehension.

The same regression was carried out for the L1 group except for the absence of needing to control for the cohort effect (Table 9). In this regression, receptive vocabulary was a significant predictor of variability in reading comprehension on its own, $F(1, 16) = 13.13$, $p = .002$, $R^2 = .45$, adjusted $R^2 = .42$. Once the PE questionnaires were added to the model, the model remained significant, although the ART and TRT did not add any unique variance to the model, $F(3, 14) = 4.31$, $p = .024$, $R^2 = .48$, adjusted $R^2 = .37$. In addition, if you look at the adjusted R^2 values, the addition of the PE variable actually

slightly decreased the amount of variance accounted for by the model. The results of this analysis should be interpreted with some caution, however, due to the low sample size. The same relationships might still exist between these measures and reading comprehension, though the variance values may change if the sample size was increased.

Due to the findings that the author recognition test was not serving as a very good predictor of reading skills, subsequent analyses were carried out using only the title recognition test. This finding is somewhat consistent with past research, which has found that the title recognition is a better and more robust predictor of reading skills in younger students (e.g, Cunningham & Stanovich, 1997). The explanation of these differences in the utility of these two measures can be explained generally because younger students tend to focus less on the authors of the stories that they read as compared to the titles of the novels or stories.

Next, both phonological awareness and title recognition were used as predictors of variability in word reading ability (see Table 10). Phonological awareness on its own predicted a significant amount of variance in word reading of L2 learners, $F(1, 47) = 18.93, p < .001, R^2 = .29$, adjusted $R^2 = .27$. Adding the title recognition test to the model along with the measure of phonological processing greatly increased the variance that could be accounted for in the model, $F(2, 46) = 16.60, p < .001, R^2 = .42$, adjusted $R^2 = .39$.

Once again, these relationships were also examined in L1 learners (Table 11). However, in this group neither of the models including phonological awareness on its own or adding the title recognition test significantly predicted word reading ability. This particular measure of phonemic awareness may not have been a significant predictor of

variance in word reading ability in the L1 group, as would be expected, possibly due to a lack of variability on this measure within the L1 group. The phonological awareness variable approached significance ($p = .06$), thus a larger sample size could have revealed greater variability in the scores on this measure and may have resulted in significance. Recognition of titles though did not approach significance, and thus would most likely not serve as a good measure in this model, even with increases to the sample.

Furthermore, in an attempt to explain why these relationships were different between the two groups, we included the Activity preference score for reading to an analyses predicting reading comprehension (see Table 12). For the L1 group, we first entered phonological awareness, which was a unique predictor of reading comprehension in the L1 group, $F(1, 16) = 9.47, p = .007, R^2 = .37$, adjusted $R^2 = .33$. Interestingly, when adding the title recognition test and reading preference, the variance significantly increased, $F(3, 14) = 11.17, p = .001, R^2 = .71$, adjusted $R^2 = .64$. Once again, title recognition was not a significant unique predictor of variance in this model but the APQ was significantly related to reading in this group. This model was examined in the L2 group, however, the activity preference score did not add any additional unique variance to the model, whereas the model was still significant because the title recognition test was included and added variance in predicting reading comprehension, $F(3, 19) = 7.99, p = .001, R^2 = .56$, adjusted $R^2 = .49$.

In summary, these hierarchical regression models have shown some interesting relationships with respect to the specific role PE plays in the development of reading comprehension and word reading. In the L2 group, the TRT was found to be a unique predictor of reading comprehension even after factors such as receptive vocabulary and

nonverbal reasoning were controlled. In addition, the TRT was a unique predictor of word reading after phonological awareness was entered as a factor. In the L1 group though, the TRT was not a significant predictor of either reading comprehension or word reading, the potential explanations of this will be discussed. However, one factor that did predict differences in reading comprehension in the L1 group, was the APQ score for reading after phonological awareness was entered.

Average and poor comprehenders

One of the goals in analyzing the mean scores of the students was to examine the possibility that there would be a large amount of variance within groups in terms of scores on several measures such as reading comprehension, accuracy, and speed. In order to determine which students are at-risk for reading disabilities, we divided the Spanish-speaking students into two groups based on reading comprehension scores. Due to limited sample size in the L1 group, this analyses was not carried out on their scores, partly due to less variability and due to the even smaller sample size that would be created as a result of breaking these students up into groups who fell into an average reader group (between the 25th and 70th percentile) or a poor reader group (below the 25th percentile). It should be noted that these percentile ranks are based on standardized scores, originally calculated in the development of these tests in primarily L1, middle SES communities. The readers below the 25th percentile in this group are comparable to L1 readers placed below the 25th percentile in diagnosis and assessment as well. Dividing the L2 learners into these two groups was based on students reading comprehension scores on the NEALE analysis of reading. Despite the fact that there are students who are 'at-risk' for reading difficulties who do not have limited comprehension skills but have

deficits at the level of word reading, we did not further break up our groups at this level, once again due to the small number of students that would fit into this group based on criteria for doing so. Also, previous research has shown that although many L2 learners acquire adequate word level reading skills (Chiappe, Siegel & Gottardo, 2002; Geva & Yaghoub-Zadeh, 2006; Lesaux & Siegel, 2003), reading comprehension difficulties persist (August & Shanahan, 2006).

After splitting the students into these two groups, 27 students met the criteria for having poor comprehension skills, and 17 students met the criteria for being average comprehenders. There was also a significant proportion of students (N = 6) who fell into criteria of being above the 75th percentile on the reading comprehension, however, this group of participants is another type of exceptional group, which is beyond the scope of the current study and thus was not analyzed in reference to the other two groups of students.

Two regression analyses were conducted in order to determine whether there were differential effects of PE in explaining reading comprehension for the average versus poor comprehenders. For the poor comprehender group, a model was run that tested the predictive value of phonological awareness, rapid automatized naming of digits, and the title recognition test, in explaining variance in reading comprehension—the variable of interest in these two groups (see Table 13 and 14). Phonological awareness on its own did not explain a significant amount of variance in reading comprehension, although, once rapid naming was added, the model reached significance, $F(2, 24) = 5.22, p = .013, R^2 = .30$, adjusted $R^2 = .25$. In the average comprehender group, the same analysis was run,

however, none of the variables produced a significant model that explained variance in the reading comprehension scores of this group.

One additional aspect that was added to this analysis involved looking at the profiles of scores between these two groups of students. These analyses were similar to the descriptive analysis carried out earlier comparing the two cohorts of students and the L1 group. This was particularly revealing, as the poor comprehender group displayed profiles typically associated with students with reading disabilities or high-risk students who are having trouble attaining adequate reading comprehension skills. Upon further analysis in comparing the poor versus average comprehenders, there were significant differences between the two groups on most measures, including nonverbal reasoning (MAT). For this reason, further analyses were carried out to subdivide the poor comprehension students into those with average to high nonverbal intelligence (35^{th} percentile and higher), and those with low scores on nonverbal intelligence (below 35^{th} percentile). Those with poor comprehension and poor nonverbal reasoning were placed into the 'garden-variety' poor reader group, and those with poor comprehension but average nonverbal reasoning were placed in the 'at-risk RD' group. All of the students in the high comprehension group placed above the 35^{th} percentile on this test and thus were left in the so-called 'typical' group.

The profiles of these students (see Table 15) reveal many expected differences between the groups. Because the students were divided based on comprehension and nonverbal intelligence, there are significant differences between the typical and garden-variety group on measures of both comprehension and nonverbal intelligence. The tasks in which the typical group outperformed both the at-risk RD and garden-variety group

included measures of reading ability such as word identification, word attack, reading accuracy and comprehension, and word and nonword reading fluency. The typical group outperformed the garden-variety poor readers on measures of receptive vocabulary, the similarities subtest of the WISC, oral vocabulary and the number of items recalled on a working memory task. The results suggest that the garden-variety poor reader group showed a global delay in language tasks and nonverbal reasoning. The at-risk group had similar reading and phonological awareness scores to the general delay group but had general language skills between the other two groups, specifically the normally achieving ESL students and ESL students with general language delays.

Discussion

To date, there has been no research conducted looking at the extent to which PE can be used to predict reading comprehension in the L2 population. This study is the first to empirically examine the role of extracurricular reading in this specific L2 population. The goal of the study was to look at the potential differences that could emerge between L1 and L2 learners in terms of various cognitive skills related to reading and to examine the differential effect PE could have in explaining differences in reading ability.

One difference that emerged in the analyses was the difference between the two samples of L2 students tested. This difference was not expected, as there is not typically a significant difference in performance from one year to the next year on measures such as vocabulary and word reading. Although this difference was unexpected it does show some interesting and unique features of the L2 population. This evidence is just one example of how much variability there is within the L2 population, and even within the same language group. It also suggests that we should use extreme caution in making

generalizations about a large population of learners based on the amount of variability there can be from just one year to the next. There are no specific explanations as to why these differences did emerge—it could simply be due to the diversity of families within the Spanish-speaking communities we tested, or changes within the school curriculum. However, because there is no data available on these specific reasons, there is a multitude of factors that could have influenced this surprising result.

The types of differences that emerged or failed to emerge between L1 and L2 speakers were also revealing. There has been a range of results in comparing performance between these two groups, where either L2 students perform more poorly on measures of reading skills, such as syntactic awareness (the grammatical structure of sentences) and verbal working memory (e.g., Lesaux, Lipka & Siegel, 2006), and other studies, which have revealed advantages for the L2 groups on various cognitive predictors of reading ability (e.g., Lesaux & Siegel, 2003; Geva & Yaghoub-Zadeh, 2006). One factor, that may have an impact on some of the differences that emerged between the groups, was a difference at the level of nonverbal reasoning as measured by the matrix analogies test. Even though this factor was controlled for in all subsequent analyses, it could have an impact on the performance of these students throughout their schooling. These same group differences remained once nonverbal reasoning was controlled for in an analysis of covariance.

Remarkably there were many differences in the relationships between the variables of interest. Many of the relationships that were significant for the L2 group were not significant in the L1 group. Some variables showed unexpected negative correlations with reading in the L1 group. This evidence shows that relationships between

different reading skills and cognitive variables considered to be related to reading are not necessarily the same in these two groups. Although some skills are related in one language, it does not mean that they will necessarily be related in another language. For example, receptive vocabulary was not correlated with many reading skills such as word identification or pseudoword reading ability in the L1 group. However, in the L2 group, receptive vocabulary and word level reading were correlated with each other. Gottardo (2002) also found that English vocabulary knowledge was related to English word reading in young Spanish-speaking ESL children. Vocabulary acquisition appears to be a more highly related indicator of reading ability in L2 students than it is in L1 students, which may reflect differences in how the simple view of reading can be explained between these two groups.

The simple view of reading states that successful reading comprehension is based on attaining skill in listening comprehension and word reading (Gough & Tunmer, 1986), however, this model has mostly been applied to L1 students. Due to the differences that have emerged between various studies comparing L1 and L2 learners, theories of reading simply cannot be generalized to these other groups without adequate investigation. The role of vocabulary in L2 populations is proving to be a very important skill for successful reading acquisition. It has been proposed that vocabulary serves as a proxy for the development of oral language skill (Biemiller & Slomin, 2001), which has recently been applied to the simple view of reading for L2 learners (Proctor et al., 2005). Proctor and colleagues found that vocabulary knowledge was uniquely related to reading comprehension when listening comprehension was entered in the model. The difference this presents in the two models for the L1 and L2 groups is that for the L1 population

reading comprehension is based on listening comprehension and word reading, whereas in the L2 group, word reading is still important, but there is the addition of vocabulary that serves as a proxy for listening comprehension. Therefore, these findings may explain why vocabulary is more highly related to various reading related skills in this specific sample of L2 learners as well.

Other steps were made in the current study to try and understand the role of several variables in explaining reading comprehension between the groups. One of the models tested involved using predictors of receptive vocabulary and the PE tasks to predict variance in reading comprehension ability. It was found that although vocabulary was related to reading comprehension in both groups, only the title recognition test explained additional unique variance in the L2 group. These results are very exciting, as they show the usefulness of including measures of exposure to print in assessment batteries of students who are learning to read in English as a second language. It is also surprising, as previous studies have shown that the title recognition test is a unique predictor of variance in reading comprehension skills of typically developing L1 children (e.g., Cunningham & Stanovich, 1997). Although, McBride-Chang et al. (1993) only found that the effect of title recognition was significant in typically achieving L1 students before factors such as word identification, vocabulary and metacognition were taken into account. Perhaps there was not enough variance in the reading scores of these children in order for title recognition to be a useful measure, or that because most of these children in the L1 group had proficient word reading and reading comprehension scores for their age, the role of PE in this group was not strong enough to show its effects. When looking at the standard deviation of performance on the TRT in the L1 group, it was approximately

half the standard deviation of the L2 group, therefore, this could be a plausible explanation. It could also be that these students are simply not reading a lot at home and because of this, exposure to print is not a proxy for the development of better reading skills. The scores of both of the groups were very low on the PE measures, and although the scores of the L2 group were lower, there was more variability in their scores.

Another model may help to explain this outcome. When the activity preference score for reading was added to the model, it did predict a significant amount of unique variance in the reading comprehension abilities of L1 students. Thus, if the children are reading or have a preference to read over other activities, this may be the variable that really makes the impact on their reading acquisition. It is possible that over time, the students who have a preference for reading may show more gains in their skills and will eventually recognize a higher percentage of titles or authors on the measures of PE. At that point measures of PE might be useful predictors of variance in reading ability. An interesting addition to explaining the differences in PE and reading ability in the current study would be to include a measure of reading motivation, which has been found to predict differences between students reading abilities (see Morgan & Fuchs, 2007).

Other models looked at the role of PE in predicting differences in word reading ability. We found that phonological awareness was a significant predictor of variance in reading ability along with the title recognition test in the L2 group. Once again, neither of these factors were significant predictors in the L1 group. The variable that assessed phonological awareness may not have been a good indicator of the L1 students' skills as many children reached ceiling on the task. Thus, variability in phonological awareness skills may have not really been able to differentiate between students with higher versus

lower reading skills. For this reason, we could add a Pig Latin task, which may serve as a better indicator of phonological processing in subsequent research on this group of students. Therefore, a unique finding of the study was the importance of the title recognition test in relation to both word reading and reading comprehension skills in L2 learners. The role of extracurricular reading in students who may initially struggle with the acquisition of reading and reading related skills is important and may mediate the development of many skills, such as vocabulary in this group of students.

An additional goal of the current study was to identify predictors of at-risk status in students learning to read in an L2 and identify who is doing poorly within this group. For this reason we looked at the role of PE in the grade 3 students who were divided into two groups based on reading ability—those with poor reading comprehension skills and those with average reading comprehension skills. In the poor comprehender group, only the rapid automatized naming score was a significant predictor of variance in reading comprehension skills for this group. Neither phonological awareness nor the title recognition test predicted any unique variance in this group. In the average comprehender group, none of these variables were significant predictors. This finding supports previous research looking at use of rapid naming as a predictor of at-risk status, and now adds to that research that this can possibly also be applied to L2 learners (Wolf, 1997). Previous research with poor comprehenders has also shown there were no differences between L1 and L2 students in those with different types of reading difficulties, showing that the same cognitive profiles can be seen for at-risk readers in both L1 and L2 groups (Lesaux, Lipka & Siegel, 2006). They also found that the effect of phonological awareness as a predictor of reading comprehension acted differently depending on the language status—

good comprehenders, poor comprehenders, average comprehenders. This may have implications for the present study and as to whether or not, phonological awareness could predict differences depending upon group classification, which could be carried out more accurately with a larger sample size.

To further understand the differences between students who had poor reading comprehension skills the group was further subdivided into those with average and poor scores on nonverbal reasoning. This was carried out based on previous work that has identified students who are referred to as 'garden-variety poor readers' because they do not just have poor scores on tests of reading ability but also have lower scores on other measures of cognitive ability and academic achievement. Putting students into the at-risk for reading disabilities group was based on current methods used for diagnosing students with reading disabilities, which is that they must display a discrepancy between intelligence and achievement, for which nonverbal ability in the current study was used as an indicator of ability. Looking at the scores of these students compared to the typical students who demonstrated both average nonverbal reasoning and average comprehension skills, revealed expected differences that are typically found between these groups of learners. This analysis resulted in students in the at-risk group having average ability scores, once again as measured by nonverbal reasoning and also the similarities subtest of the WISC, but displayed deficits in skills such as word and pseudoword reading. The 'garden variety poor readers', however, performed as expected based on their nonverbal reasoning abilities—not showing a discrepancy in performance. This analysis resulted in approximately 20% of the sample being classified as at-risk,

where the typical percentage of students who meet this criterion had been found to range from 10-20% (e.g., Lesaux et al., 2007).

Limitations

There are several things that can be done in the future to improve the design of the current study and to better examine the differences that exist between L1 and L2 learners. Firstly, the sample size of the L1 group needs to be increased in order to ensure that the relationships found presently still exist in a larger sample with more variance, or if variables that approached significance reach significance in this larger sample. In addition, having longitudinal data on L1 students as well, would allow analyses to predict reading comprehension growth from grades 3 to 4 from measures of PE and other variable related to differences in reading skills in these students. A further step in this research would be the addition of a group of children with reading disabilities, to see what differences can be found among the three groups in terms of PE and its ability to predict reading comprehension. The results of this research could add significantly to educational needs and assessment techniques.

Summary and Conclusions

Despite some of the limitations of the current study, the utility of the title recognition test in predicting unique variance in reading comprehension and word reading beyond vocabulary and nonverbal reasoning highlights the importance of extra-curricular reading. The usefulness of this measure has often been ignored in the literature despite its ability to add significantly to explaining differences in reading ability. Specifically, now that this measure has been used in young L2 Spanish-speaking

students, it has a lot of potential in its role in predicting performance in other language groups, many of which are increasingly rising in numbers throughout Canada.

This study also compares L2 learners who are good and poor comprehenders of text. Upon further analysis of differences between these groups the poor comprehender group was further broken down into those who would fit criteria for garden-variety poor readers who having lower than expected reading ability skills but also lower than expected scores on other measures such as nonverbal reasoning. The other group of students fit criteria for being at-risk for developing, or already having a reading disability, which was based on lower than expected scores on word/pseudoword reading, etc. despite average scores on nonverbal reasoning. Expected differences were found between these two groups on the measures assessed.

One difference that did not occur in the current sample was that there were no advantages for the L2 students on any of the measures analyzed in the current study. Sometimes advantages are found on variables such as rapid naming speed etc. (e.g., Geva & Yaghoub-Zadeh, 2006), and although the L2 group performed similar to the L1 group, they did not surpass them in any of the skills suggested by previous studies. This evidence only shows that there is a large amount of variability within L2 literature due to differences in home language, home literacy experiences, age of immigration and support services provided to the students. This variability should also cause us to be more cautious in trying to generalize results between studies of different groups of L2 learners, and not to overemphasize the importance of major findings from specific studies conducted in similar areas (e.g., similar Countries, regions, etc.).

There are many variables that are problematic in reading-related research, many of which can be controlled for by attaining measures of socioeconomic status (SES; e.g., maternal education), home literacy (e.g., number of books in household), and general cognitive abilities (e.g., nonverbal reasoning). However, the usefulness of PE measures on their own may be particularly important in understanding differences in performance outcomes between students who speak different home languages, but may have all immigrated to Canada and begun learning to read in English at similar periods. In order to fully explain the potential effects of PE, additional longitudinal data needs to be collected. The ability of PE to predict future reading performance needs to be examined, in addition to looking at the reverse relationship, the ability of reading comprehension to predict future exposure to print.

References

Allen, L., Cipielewski, J., & Stanovich, K. (1992). Multiple indicators of children's reading habits and attitudes: Construct validity and cognitive correlates. *Journal of Educational Psychology, 84,* 489-503.

August, D., Carlo, M., Dressler, C., & Snow, C. (1999). The critical role of vocabulary development for English-language learners. *Learning Disabilities Research & Practice, 20,* 50-57.

August, D., & Shanahan, T. (Eds.). (2006). *Developing literacy in second language learners: Report of the National Literacy Panel on Language Minority Children and Youth.* New York: Lawrence Erlbaum Associates.

Biemiller, A., & Slomin, N. (2001). Estimating root word vocabulary growth in normative and advantaged populations: Evidence for a common sequence of vocabulary acquisition. *Journal of Educational Psychology, 93,* 498-520.

Carver, R. (1994). Percentage of unknown vocabulary words in text as a function of the relative difficulty of the text: Implications for instruction. *Journal of Reading Behavior,* 26, 413-437.

Chall, J. (1987). Two vocabularies for reading: Recognition and meaning. In M.McKeown & M. Curtis (Eds.), *The nature of vocabulary acquisition.* Hillsdale, NJ: Erlbaum.

Chall, J.S. (1996). *Learning to read: The great debate (3rd Ed.).* New York: McGraw-Hill.

Chard, D., Vaughn S., & Tyler, B. (2002). A synthesis of research on effective interventions for building reading fluency with elementary students with learning disabilities. *Journal of Learning Disabilities, 35*, 386-406.

Chiappe, P., Siegel, L. S., & Gottardo, A. (2002). Reading-related skills of kindergartners from diverse linguistic backgrounds. *Applied Psycholinguistics, 23*, 95-116.

Chiappe, P., Siegel, L., & Wade-Woolley, L. (2002). Linguistic diversity and the development of reading skills: A longitudinal study. *Scientific Studies of Reading, 91*, 20-28.

Cunningham, A., & Stanovich, K. (1997). Early reading acquisition and its relation to reading experience and ability 10 years later. *Developmental Psychology, 33,* 934-945.

Daneman, M., & Carpenter, R A. (1980). Individual differences in working memory and reading. Journal of Verbal Learning and Verbal Behavior, 19, 450-466.

Dunn, L., & Dunn, L. (1981). *The Peabody-Picture Vocabulary Test-Revised.* Circle Pines, MN: American Guidance Service.

Durgunoglu, A., Nagy, W., & Hancin-Bhatt, B. (1993). Cross-language transfer of phonological awareness. *Journal of Educational Psychology, 85,* 453-465.

Echols, L., West, R., Stanovich, K., & Zehr, K. (1996). Using children's literacy activities to predict growth in verbal cognitive skills: A longitudinal investigation. *Journal of Educational Psychology, 88,* 296-304.

Feldman, A., & Healy, A.F. (1998). Effects of first language phonological configuration on lexical acquisition in a second language. In A. F. Healy & L. E. Bourne (Eds.). *Foreign Language Learning: Psycholinguistic studies on training and retention* (pp. 57-75). Mahwah, NJ: Erlbaum.

Fiedorowicz, C., Benezra, E., MacDonald W., McElgunn B., Wilson A., & Kaplan B. (2001). Neurobiological basis of learning disabilities: An update. *Learning Disabilities: A Multidisciplinary Journal, 11*, 61-74.

Francis, D., Snow, C., August, D., Carlson, C., Miller, J., & Iglesias, A. (2006). Measures of reading comprehension: A latent variable analysis off the diagnostic assessment of reading comprehension. *Scientific Studies of Reading*, 10, 301-322.

Gandour, J., Tong, Y., Talvage, T., Wong, D., Dzemidzic, M., Xu, Y., Xiaojian, L., & Lowe, M. (2007). Neural basis of first and second language processing of sentence level linguistic prosody. *Human Brain Mapping, 28,* 94-108.

Geva, E. (1999) Issues in the development of second language reading: Implications for instruction and assessment. In T. Nunes (Ed.), *Learning to Read (pp.* 343-367).

Geva, E., & Siegel, L.S. (2000). Orthographic and cognitive factors in the concurrent development of basic reading skills in two languages. *Reading and Writing: An Interdisciplinary Journal*, 12, 1-30.

Geva, E., Yaghoub-Zadeh, Z., & Schuster, B. (2000). Individual differences in word recognition skills of ESL children. *Annals of Dyslexia, 50,* 123-154.

Geva, E., & Yaghoub-Zadeh, Z. (2006). Reading Efficiency in Native English-Speaking and English-as-a-Second-Language Children: The Role of Oral Proficiency and Underlying Cognitive-Linguistic Processes. *Scientific Studies of Reading, 10,* 31-57.

Gholamain, M., & Geva, E. (1997). The role of orthography and cognitive factors in the concurrent development of basic reading skills in bilingual Persian-English children. *Language Learning, 49,* 183-217.

Goswami, U., Gombert, J. E., & de Barrera, L. F. (1998). Children's orthographic representations and linguistic transparency: Nonsense word reading in English, French, and Spanish. *Applied Psycholinguistics, 19*, 19-52.

Gottardo, A., Stanovich, K. E., & Siegel, L. S. (1996). The relationships between phonological sensitivity, syntactic processing, and verbal working memory in the reading performance of third-grade children. *Journal of Experimental Child Psychology, 63,* 563-582.

Gottardo, A., Yan, B., Siegel, L., & Wade-Woolley, L. (2001). Factors related to English reading performance in children with Chinese as a first language: More evidence of cross-language transfer of phonological processing. *Journal of Educational Psychology, 93*, 530-542.

Gottardo, A. (2002). The relationship between language and reading skills in bilingual Spanish-English speakers. *Topics in Language Disorders, 22,* 46-70.

Gough, P. B., & Tunmer, W. (1986). Decoding, reading, and reading disability. *Remedial and Special Education, 7,* 6-10.

Grant, A., Wilson, L., & Gottardo, A. (in press). Using measures of print to predict reading skills in college students with and without reading disabilities. *Exceptionality Education Canada: Special Issue.*

Hall, V., Chiarello, K., & Edmondson, B. (1996). Deciding where knowledge comes from depends on where you look. *Journal of Educational Psychology, 88,* 305-313.

Hoien, T., Lundberg, I., Stanovich, K., & Bjaalid, I. (1995). Components of phonological awareness. Reading and Writing, 7, 171-188.

Lesaux, N. K., & Siegel, L. S. (2003). The development of reading in children who speak English as a second language. *Developmental Psychology, 39*, 1005–1019.

Lesaux, N., Lipka, O., & Siegel, L. (2006). Investigating cognitive and linguistic abilities that influence the reading comprehension skills of children from diverse linguistic backgrounds. *Reading and Writing, 19,* 99-131.

Lindsey, K., Manis, F., & Bailey, C. (2003). Prediction of first-grade reading in Spanish-speaking English-language learners. *Journal of Educational Psychology, 95*, 482-494.

Manis, F., Lindsey, K., & Bailey, C. (2004). Development of reading in grades K-2 in Spanish-speaking English-language learners. *Learning Disabilities Research & Practice, 19*, 214-224.

McBride-Chang, C., Manis, F., Seidenberg, M., Custodio, R., & Doi, L. (1993). Print exposure as a predictor of word reading and reading comprehension in disabled and nondisabled readers. *Journal of Educational Psychology, 85,* 230-238.

Morgan, P., & Fuchs, D. (2007). Is There a Bidirectional Relationship Between Children's Reading Skills and Reading Motivation? *Exceptional Children, 73,* 165-183.

Naglieri, J. (1989). *Matrix Analogies Test – Expanded Form.* San Antonio, TX: Psychological Corporation.

Neale, M. (1989). *Neale Analysis of Reading Ability.* Windsor: NFER-Nelson.

Ordonez, C., Carlo, M., Snow, C., & McLaughlin, B. (2002). Depth and Breadth of Vocabulary in two-languages: Which vocabulary skills transfer? *Journal of Educational Psychology, 94,* 719-728.

Oulette, G. (2006). What's meaning got to do with it? The role of vocabulary in word reading and reading comprehension. *Journal of Educational Psychology, 98,* 554-566.

Proctor, C., Carlo, M., August, D., & Snow, C. (2005). Native Spanish-speaking children reading in English: Toward a model of comprehension. *Journal of Educational Psychology, 97,* 246-256.

Senechal, M. Testing the Home Literacy Model: Parent involvement in kindergarten is differentially related to grade 4 reading comprehension, fluency, spelling, and reading for pleasure. *Scientific Studies of Reading, 10,* 59-87.

Senechal, M., & LeFevre, J. (2002). Parental involvement in the development of children's reading skill: A 5-year longitudinal study. *Child Development, 73,* 445-460.

Siegel, L. (1993). The development of reading. In H.W. Reese (Ed.), *Advances in child development and behavior* (pp. 63-97). San Diego, CA: Academic Press.

Seymour, P., Aro, M., & Erskine, J. (2003). Foundation literacy acquisition in European orthographies. *British Journal of Psychology, 94,* 143-174.

Snow, C., & Locke, J. (2001). Quality of phonological representation of lexical items (Special Issue). *Applied Psycholinguistics, 22,* 283-477.

Snowgrass, J., & Corwin, J. (1988). Pragmatics of measuring recognition memory: Applications to dementia and amnesia. *Journal of Experimental Psychology: General, 117,* 34-50.

Stanovich, K., Cunningham, A., & Cramer, B. (1984). Assessing phonological awareness in kindergarten children: Issues of task comparability. *Journal of Experimental Child Psychology, 38,* 175-190.

Stanovich, K. (1986). Matthew effects in reading: Some consequences of individual differences in the acquisition of literacy. *Reading Research Quarterly, 21,* 360-407.

Stanovich, K.E., & West, R. (1989). Exposure to print and orthographic processing. *Reading Research Quarterly, 24,* 402-433.

Stanovich, K.E., & Cunningham, A. (1993). Where does knowledge come from? Specific associations between print exposure and information acquisition. *Journal of Educational Psychology, 85,* 211-229.

Stanovich, K., & Siegel, L. (1994). Phenotypic performance profile of children with reading disabilities: A regression-based test of the phonological-core variable-difference model. *Journal of Educational Psychology, 86,* 24-53.

Stanovich, K., West, R., & Harrison, M. (1995). Knowledge growth and maintenance across the life span: The Role of print exposure. *Developmental Psychology, 31*, 811-826.

Statistics Canada. (2001). Census of Canada. Retreived June 12, 2006, from http://www12.statcan.ca/english/census01/products/analytic/companion/lang/canada.cfm.

Swanson, H., Saez, L., Gerber, M., & Leafstedt, J. (2004). Literacy and cognitive functioning in bilingual and nonbilingual children at or not at risk for reading disabilities. *Journal of Educational Psychology, 96,* 3-18.

Wagner, R., & Torgensen, J. (1987). The nature of phonological processing and its causal role in the acquisition of reading skills. *Psychological Bulletin, 101,* 192-212.

Wagner, R., Torgensen, J., & Rashotte, C. (1999). *Comprehensive Test of Phonological Processessing.* Austin, TX: Pro-ED.

Wechsler, D. (1991). *Wechsler Intelligence Scale for Children-III.* San Antonio, TX: Psychological Corporation.

West, R., Stanovich, K., & Mitchell, H. (1993). Reading in the real world and its correlates. *Reading Research Quarterly, 28,* 34-50.

Wolf, M. (1997). A provisional, integrative account of phonological and naming-speed deficits in dyslexia: Implications for diagnosis and intervention. In B. Blachman (Ed.), Foundations of reading acquisition and dyslexia; Implications for early intervention (pp. 67-92). Mahwah, NJ: Lawrence Erlbaum Associates, Inc.

Woodcock, R. (1987). *Woodcock Reading Mastery Test, Revised.* Circle Pines, MN: American Guidance Service, Inc.

Woodcock, R. (1991). *Woodcock Language Proficiency Battery, Revised.* Chicago: Riverside.

Woodcock, R., McGrew, K., & Mather, N. (2002). *Woodcock-Johnson Tests of Achievement,* 3rd ed. Itasca, IL: Riverside-Publishing.

Ziegler, J., & Goswami, U. (2005). Reading acquisition, developmental dyslexia, and skilled reading across languages: A psycholinguistic grain size theory. *Psychological Bulletin, 131,* 3-29.

Table 1

Performance on All Measures by Group—L1 (Spanish speakers), broken up into Cohort 1 and Cohort 2, and L2 (native English speakers) in Grade 2

	L2-Cohort 1 (n = 26)		*L2-Cohort 2* (n = 24)		*L1* (n = 13)		*Differences*[*]
	Mean	SD	Mean	SD	Mean	SD	
PPVT (RS)	85.77	18.37	96.77	17.70	118.38	9.24	3 > 1, 2
PPVT (SS)	85.35	14.52	94.23	14.71	110.15	7.46	
Word Identification (RS)	39.96	17.61	56.64	12.95	53.85	6.73	2, 3 > 1
Word Identification (SS)	96.42	16.50	112.23	17.06	108.38	8.32	
Word Attack (RS)	18.54	11.10	24.23	9.44	25.85	5.70	3 > 1
Word Attack (SS)	99.23	16.27	107.45	15.07	108.23	7.62	
Reading Speed							
RAN (letters)	51.04	16.06	38.26	6.28	44.60	6.40	
RAN (digits)	47.09	15.40	40.79	7.34	42.44	7.53	
TOWRE							
Words (RS)	37.36	17.30	53.00	15.38	52.62	8.54	2, 3 > 1
Words (SS)	96.00	14.30	110.41	15.54	106.46	9.36	
Pseudowords (RS)	16.20	10.24	25.36	11.82	23.69	8.29	2 > 1
Pseudowords (SS)	93.60	23.07	107.91	13.30	104.62	10.52	
Phonological Awareness	24.88	7.58	28.64	4.70	28.77	2.98	
Passage Comp. (RS)	12.96	5.10	16.45	3.52	19.00	2.42	2, 3 > 1
Passage Comp. (SS)	101.20	15.30	111.13	12.96	118.08	9.38	
MAT (RS)	20.76	10.03	24.05	8.42	30.69	3.71	3 > 1, 2
MAT (SS)	99.68	11.02	98.27	21.11	108.46	4.20	

Note. SS = Standardized Score; RS = Raw Score; PPVT = Peabody Picture Vocabulary Test-Revised; RAN = Rapid Automatized Naming; TOWRE = Test of Word Reading Efficiency; Phonological Awareness, maximum test score=36; Passage Comprehension from the Woodcock Language Proficiency Battery-Revised; MAT= Matrix Analogies Test.

[*]1 = L2, Cohort 1; 2 = L2, Cohort 2; 3 = L1 (differences are based on raw scores)

Table 2

Performance on All Measures by Group—L1 (Spanish speakers), broken up into Cohort 1 and Cohort 2, and L2 (native English speakers) in Grade 3

	L2-Cohort 1 (n = 26)		*L2-Cohort 2* (n = 24)		*L1* (n = 18)		*Differences*[*]
	Mean	SD	Mean	SD	Mean	SD	
PPVT (RS)	97.92	15.57	110.67	22.04	132.39	14.20	3 > 1, 2
PPVT (SS)	85.11	10.94	95.83	17.38	112.50	11.18	
Word Identification (RS)	51.46	18.12	65.25	14.49	67.00	8.40	2, 3 > 1
Word Identification (SS)	91.04	18.61	107.58	18.94	110.00	10.57	
Word Attack (RS)	22.08	10.86	27.54	9.24	31.67	7.05	3 > 1
Word Attack (SS)	92.08	17.88	104.08	15.30	111.94	15.91	
Reading Speed							
RAN (letters)	43.34	15.08	38.26	6.28	38.71	5.25	
RAN (digits)	39.24	9.34	48.97	7.56	36.83	6.35	
TOWRE							
Words (RS)	51.08	17.94	60.88	11.06	63.39	11.82	3 >1
Words (SS)	97.69	16.18	108.00	12.80	111.28	12.55	
Pseudowords (RS)	23.31	12.60	13.62	10.59	33.39	10.30	2, 3 > 1
Pseudowords (SS)	97.27	14.38	108.79	13.60	110.83	11.59	
Phonological Awareness	6.54	3.86	7.33	4.08	10.61	1.72	3 > 1, 2
Reading Rate (RS)	57.15	26.61	68.43	28.63	73.50	19.78	
Reading Rate (SS)	98.04	14.00	103.00	13.08	107.56	9.10	
Reading Accuracy (RS)	39.73	22.04	50.56	20.21	57.17	16.48	3 > 1
Reading Accuracy (SS)	92.50	13.70	100.13	13.42	104.83	11.06	
Reading Comp. (RS)	11.58	7.28	17.96	8.76	24.72	7.58	3 > 2 > 1
Reading Comp. (SS)	85.27	11.83	95.91	14.05	106.67	10.58	
MAT (RS)	25.04	6.69	29.75	10.06	39.89	10.44	3 > 1, 2
MAT (SS)	94.56	7.33	99.75	11.89	110.61	10.69	

Note. Maximum score on this part of the phonological awareness test was 12, which was part 3 of the original version of the test used with all of the grade 2 participants.

[*]1 = L2, Cohort 1; 2 = L2, Cohort 2; 3 = L1 (differences are based on raw scores)

Table 3

Intercorrelations among Grade 2 Variables with Spanish speaking participants below the diagonal and English speaking participants above the diagonal

Variable	1	2	3	4	5	6	7	8	9
1. PPVT	__	.06	-.25	.26	-.07	.05	-.23	-.62*	-.04
2. Word ID	.42**	__	.51	-.41	-.46	.80**	.87**	.44	.63*
3. Word Attack	.30*	.81**	__	-.01	-.14	.46	.68*	.59*	.27
4. RAN digits	-.22	-.55**	-.51**	__	.45	-.63*	-.52	-.26	-.52
5. RAN letters	-.29	-.66**	-.67**	.78**	__	-.58*	-.49	-.17	-.60*
6. TOWRE (words)	.40**	.83**	.70**	-.51**	-.60**	__	.71**	.31	.73**
7. TOWRE (nonwords)	.36*	.78**	.76**	-.54**	-.62**	.79**	__	.63*	.65*
8. PA	.29	.53**	.51**	-.20	-.48**	.52**	.33*	__	.42
9. Passage Comp.	.27	.78**	.60**	-.56**	-.64**	.81**	.60**	.55**	__

*Correlation is significant at the 0.05 level (two-tailed)
**Correlation is significant at the 0.01 level (two-tailed)

Note. The correlations for the Spanish-speaking participants reflect the relationships between variables after the effect of cohort was partialled out. In addition, scores on the MAT were partialled out for both groups.

Table 4

Intercorrelations among Grade 2 Variables with Cohort 1 Spanish speaking participants below the diagonal and Cohort 2 Spanish speaking participants above the diagonal

Variable	1	2	3	4	5	6	7	8	9
1. PPVT	__	.54*	.24	-.42	-.44*	.71**	.66**	.08	.43
2. Word ID	.36	__	.74**	-.59**	-.51**	.83**	.83**	.31	.59**
3. Word Attack	.34	.88**	__	-.44*	-.63**	.61**	.73**	.21	.36
4. RAN digits	-.16	-.56**	-.56**	__	.60**	-.54*	-.75**	-.05	-.44*
5. RAN letters	-.25	-.73**	-.73**	.81**	__	-.56**	-.71**	-.10	-.43
6. TOWRE (words)	.16	.84**	.81**	-.56**	-.67**	__	.78**	.40	.74**
7. TOWRE (nonwords)	.07	.77**	.85**	-.55**	-.68**	.82**	__	.20	.54*
8. PA	.45*	.64**	.73**	-.25	-.61**	.59**	.45*	__	.45*
9. Passage Comp.	.20	.88**	.77**	-.63**	-.73**	.87**	.69**	.57**	__

*Correlation is significant at the 0.05 level (two-tailed)
**Correlation is significant at the 0.01 level (two-tailed

Note. The correlations for the Spanish-speaking participants reflect the relationships between variables after scores on the MAT were partialled out.

Table 5

Intercorrelations among Grade 3 Variables with Spanish speaking participants below the diagonal and English speaking participants above the diagonal

**See next page for table

Note. The correlations for the Spanish-speaking participants reflect the relationships between variables after the effect of cohort was partialled out. In addition, scores on the MAT were partialled out for both groups.

Variable	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1. PPVT	__	.45	.05	-.35	-.23	.59*	.43	-.06	.47	.57*	.58*	.18	.39	.47
2. Word ID	.38*	__	.53*	-.48	-.49*	.80**	.90**	.04	.96**	.81**	.61**	.44	-.12	.12
3. Word Attack	.32*	.82**	__	-.35	-.44	.45	.51*	-.27	.59*	.31	.39	.56*	-.12	.10
4. RAN digits	-.17	-.47**	-.44**	__	.80**	-.79**	-.59*	.30	-.38	-.28	-.59*	-.17	.36	-.40
5. RAN letters	-.15	-.49**	-.43**	.82**	__	-.70**	-.70**	.20	-.42	-.43	-.60	-.42	.45	-.36
6. TOWRE (words)	.25	.80**	.73**	-.57**	-.57**	__	.86**	-.12	.75**	.71**	.82**	.46	-.08	.28
7. TOWRE (nonwords)	.29	.86**	.80**	-.59**	-.51**	.83**	__	.02	.87**	.72**	.67**	.40	-.27	.19
8. Digit span-bkwds.	-.10	.36*	.40**	-.27	-.22	.23	.42**	__	.06	.11	-.24	.07	.15	-.52*
9. Neale Accuracy	.45**	.87**	.77**	-.60**	-.52**	.78**	.84**	.36*	__	.78**	.58*	.49*	-.04	.18
10. Neale Comp.	.61**	.72**	.68**	-.50**	-.44**	.61**	.72**	.43**	.82**	__	.60*	.65**	.14	.17
11. Neale Rate	.47**	.51**	.38*	-.42**	-.42**	.67**	.54**	.07	.42**	.43**	__	.43	.16	.36
12. PA	.34*	.54**	.66**	-.34*	-.32*	.42**	.56**	.15	.59**	.42**	.25	__	.07	-.06
13. TRT-z	.25	.43**	.39**	-.63**	-.63**	.45**	.38*	.20	.53**	.51**	.37*	.33*	__	.08
14. ART-z	.21	.23	.19	.01	-.11	.21	.19	.09	.26	.30	.19	.17	.34*	__

*Correlation is significant at the 0.05 level (two-tailed)

**Correlation is significant at the 0.01 level (two-tailed)

Table 6

Intercorrelations among Grade 3 Variables with Cohort 1 of Spanish speaking participants below the diagonal and Cohort 2 of Spanish speaking participants above the diagonal

**See next page for table

Note. The correlations for the Spanish-speaking participants reflect the relationships between variables after MAT scores were partialled out.

Variable	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1. PPVT	__	.50*	.46*	-.19	-.08	.60**	.38	-.10	.62**	.72**	.65**	.34	.52*	.38
2. Word ID	.30	__	.77**	-.27	-.39	.82**	.82**	.32	.80**	.65**	.54*	.54*	.41	.43
3. Word Attack	.18	.87**	__	-.28	-.34	.74**	.80**	.42	.72**	.65**	.38	.76**	.35	.34
4. RAN digits	-.19	-.60**	-.54**	__	.87**	-.37	-.46*	-.43	-.56**	-.46*	-.24	-.33	-.32	.05
5. RAN letters	-.25	-.57**	-.49*	.85**	__	-.43	-.59**	-.44*	-.57**	-.51*	-.17	-.38	-.23	-.12
6. TOWRE (words)	.26	.87**	.81**	-.60**	-.65**	__	.84**	.20	.85**	.74**	.68**	.60**	.58**	.30
7. TOWRE (nonwords)	.21	.90**	.82**	-.69**	-.54**	.81**	__	.49*	.80**	.71**	.58**	.70**	.36	.44*
8. Digit span-bkwds.	-.11	.40	.39	-.16	-.17	.22	.37	__	.27	.39	.04	.26	.01	.10
9. Neale Accuracy	.25	.94**	.81**	-.63**	-.56**	.86**	.89**	.42*	__	.76**	.48*	.72**	.46*	.30
10. Neale Comp.	.42*	.85**	.74**	-.56**	-.51**	.73**	.77**	.47*	.90**	__	.56**	.49*	.55*	.41
11. Neale Rate	.30	.48*	.41	-.58**	-.60**	.63**	.49*	.11	.40	.36	__	.30	.68**	.41
12. PA	.32	.56**	.58**	-.36*	-.35	.41*	.47*	.06	.48*	.31	.24	__	.28	.18
13. TRT-z	.17	.49*	.43*	-.53**	-.70**	.54**	.45*	.29	.61**	.58**	.35	.38	__	.30
14. ART-z	-.06	.12	.08	-.03	-.14	.24	.01	.08	.22	.14	.07	.14	.37	__

*Correlation is significant at the 0.05 level (two-tailed)
**Correlation is significant at the 0.01 level (two-tailed)

Table 7

Hierarchical Multiple Regression Analysis Predicting Reading Comprehension in L2 Grade 3's

Variables (predictors)	R^2	*Beta* weights	*t*-value
Step 1:	.163*		
Cohort		.404	2.99*
Step 2:	.521**		
Cohort		.195	1.78
PPVT		.634	5.80**
Step3:	.625**		
Cohort		.093	0.90
PPVT		.521	4.96**
TRT		.331	3.04*
ART		.075	0.71

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

Table 8

Hierarchical Multiple Regression Analysis Predicting Reading Comprehension in L2 Grade 3's

Variables (predictors)	R^2	*Beta* weights	*t*-value
Step 1:	.163*		
Cohort		.404	2.99*
Step 2:	.521**		
Cohort		.195	1.78
PPVT		.634	5.80**
Step3:	.593**		
Cohort		.145	0.90
PPVT		.502	4.96**
MAT		.310	3.04*
Step 4:	.679**		
Cohort		.062	0.65
PPVT		.422	4.08**
MAT		.280	2.79*
TRT		.329	3.39*

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

Table 9

Hierarchical Multiple Regression Analysis Predicting Reading Comprehension in L1 Grade 3's

Variables (predictors)	R^2	*Beta* weights	*t*-value
Step 1:	.451*		
PPVT		.671	3.62*
Step 2:	.480*		
PPVT		.782	3.32*
TRT		-.104	-.48
ART		-.170	-.81

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

Table 10

Hierarchical Multiple Regression Analysis Predicting Word Identification in L2 Grade 3's

Variables (predictors)	R^2	*Beta* weights	*t*-value
Step 1:	.287**		
PA		.536	4.35**
Step 2:	.419**		
PA		.403	3.37*
TRT		.387	3.23*

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

Table 11

Hierarchical Multiple Regression Analysis Predicting Word Identification in L1 Grade 3's

Variables (predictors)	R^2	*Beta* weights	*t*-value
Step 1:	.204		
PA		.452	2.03
Step2:	.212		
PA		.460	1.99
TRT		-.090	-.39

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

Table 12

Hierarchical Multiple Regression Analysis Predicting Reading Comprehension in L2 Grade 3's

Variables (predictors)	R^2	*Beta* weights	*t*-value
Step 1:	.327*		
PA		.572	3.19*
Step 2:	.558**		
PA		.525	2.96*
TRT		.510	3.14*
APQ (reading)		.184	1.02

Table 13

Hierarchical Multiple Regression Analysis Predicting Reading Comprehension in L1 Grade 3's

Variables (predictors)	R^2	*Beta* weights	*t*-value
Step 1:	.372*		
PA		.610	3.08*
Step2:	.705**		
PA		.565	3.88*
TRT		.066	0.44
APQ (reading)		.560	3.75*

Table 14

Hierarchical Multiple Regression Predicting Reading Comprehension of L2 "Poor vs. Average Comprehenders" in Grade 3 students

		Poor Comp.			Avg. Comp.	
Variables (predictors)	R^2	*Beta* weights	*t*-value	R^2	*Beta* weights	*t*-value
Step 1:	.135			.079		
PA		.367	1.97		.281	1.14
Step3:	.303*			.122		
PA		.287	1.65		.203	.76
RAN digits		-.418	-2.41*		-.221	-.83
Step 3:	.326*			.239		
PA		.246	1.37		.252	.97
RAN digits		-.335	-1.70		-.141	-.53
TRT		.180	0.89		.351	1.41

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

Table 15

Performance on All Measures by Group—At-risk RD, Garden Variety Poor Readers and Typical Readers, in Grade 3

	At-risk RD (n = 12)		*Garden Variety* (n = 15)		*Typical* (n = 16)		*Differences*[*]
	Mean	SD	Mean	SD	Mean	SD	
PPVT (SS)	86.67	10.35	78.93	8.76	94.56	8.26	3 > 1
Word Identification (SS)	92.92	14.47	81.07	15.75	111.12	13.23	3 > 1, 2
Word Attack (SS)	92.75	12.00	83.80	18.15	107.62	10.49	3 > 1, 2
Reading Speed							
RAN (letters)	40.40	6.44	46.25	19.09	38.66	5.68	
RAN (digits)	40.09	6.79	39.56	11.55	36.78	6.82	
TOWRE							
Words	98.33	11.12	92.47	17.97	108.50	9.47	3 > 1, 2
Pseudowords	98.42	10.85	91.60	13.60	108.75	8.83	3 > 1, 2
Phonological Awareness	5.42	4.36	5.67	3.84	8.31	3.61	
Reading Rate	99.08	11.13	94.60	16.19	102.00	11.21	
Reading Accuracy	90.75	9.80	84.13	9.65	104.56	8.24	3 > 1, 2
Reading Comprehension	83.25	5.40	77.40	6.38	98.81	6.32	3 > 1, 2
WISC Similarities (SS)	9.08	2.94	5.73	3.45	9.68	2.47	3 > 1
Oral Vocabulary (SS)	92.25	8.37	86.33	9.41	99.19	10.88	3 > 1
WM-items recalled	13.00	4.02	9.73	5.13	16.31	4.87	3 > 1
WM-comprehension	22.33	1.97	22.20	2.15	25.00	5.27	
MAT (SS)	100.67	5.23	87.13	8.79	101.56	7.58	3 > 1

Note. Maximum score on this part of the phonological awareness test was 12, which was part 3 of the original version of the test used with all of the grade 2 participants. WM = working memory task; MAT = matrix analogies task.

[*]1 = at-risk RD (reading disabilities) group; 2 = Garden Variety poor readers; 3 = Typical Readers (differences are based on raw scores)

Appendix 1

Author Recognition Test

Below you will see a list of names. Some of the people in the list are popular writers (of books, magazine articles, and/or newspaper columns) and some are not. You are to read the names and put an "X" next to the names of those individuals who you know to be writers. Do not guess, but only check those who you know to be writers. Remember, some of the names are people who are not popular writers, so please try not to guess!

Authors	Pls "X" the real names
Lauren Adamson	
Lloyd Alexander	
Carter Anvari	
Linda Bailey	
William Banker	
Oscar Barbarian	
Judy Blume	
Reuben Baron	
Lauren Benjamin	
Jan Brett	
Charlotte Bronte	
Thomas Bever	
Brian Bigelow	
Harrison Boldt	
Clyde Bulla	
Arnold Burron	
Elliot Blass	
Hilda Borko	
Betsy Byars	
Jennifer Butterworth	
Eric Carle	
Lewis Caroll	
Katherine Carpenter	
Devon Chang	
Naomi Choy	
Beverley Cleary	
Charles Condie	
Bruce Coville	
Suzanne Crank	
Roald Dahl	
H. P. Daniels	
Kate DiCamillo	
Franklin W. Dixon	
George Fitz	
John D. Fitzgerald	
Frances Fincham	
Jean Fritz	
Martin Ford	
Howard Gardner	
Frank Gresham	
Mimi Hall	
Virginia Hamilton	
Erin Hunter	
Robert Inness	
Tabitha Kan	
Kirby Kavanagh	
Carolyn Keene	
Frank Kiel	
P. B. Kerr	

Jim Kjelgaard	
Stirling King	
Rita Klosterman	
E. L. Konigsburg	
Allen Kurzwal	
Robert Lawson	
Reed Larson	
Donald Lashinger	
C. S. Lewis	
Sara Lundsteen	
Lynn Liben	
Hugh Lofting	
Jack London	
Franklin Manis	
Sophia Martin	
Morton Mendelson	
Lucy Maud Montgomery	
Robert Munsch	
Scott O'Dell	
Mary Pope Osborne	
Samuel Paige	
Peggy Parish	
Scott Paris	
Richard Passman	
Katherine Paterson	
Robert Newton Peck	
David Perry	
Tamora Pierce	
Alex Preston	
J. K. Rowling	
Chris Riddell	
Peter Rigg	
Keith Robertson	
Dr. Seuss	
J. Harlan Shores	
Lewis Smith	
Mavis Staples	
Elizabeth George Speare	
Mark Strauss	
R. L. Stine	
Mary Stolz	
K. Warner Schaie	
David Singer	
Thomas Turner	
Harper Trophy	
Chris van Allsburg	
Tracey West	
Summer Williams	
E. B. White	
Laura Ingalls Wilder	

Appendix 2

Title Recognition Test

Below you will see a list of book titles. Some of the titles are the names of actual books and some are not. You are to read the names and put a check mark next to the names that you know are books. Do not guess, but only check those that you know are actual books. Remember, some of the titles are not those of popular books, so guessing can easily be detected.

A Light in the Attic ____
How to Eat Fried Worms ____
Call of the Wild ____
Joanne ____
It's My Room ____
Hatchet ____
Tales of a Fourth Grade Nothing ____
Hot Top ____
The Polar Express ____
Don't Go Away ____
The Indian in the Cupboard ____
The Trouble with Tuck ____
The Hidden One ____
Homer Price ____
The Missing Letter ____
Heidi ____
The Rollaway ____
Freedom Train ____
Sadie Goes to Hollywood ____
James and the Giant Peach ____
By the Shores of Silver Lake ____
Superfudge ____
The Case of the Unbreakable Walking Mirror ____
The Schoolhouse ____
Dr. Doolittle ____
He's Your Little Brother! ____
From the Mixed-Up Files of Mrs. Basil E. Frankweiler ____
Ethan Allen ____
The Lost Shoe ____
Island of the Blue Dolphins ____
Skateboard ____
Ramona the Pest ____
Iggie's House ____
The Giant Brain ____
The Winter Worm Business ____
Searching the Wilds ____
Henry and the Clubhouse ____

Dear Mr. Henshaw ____
Harriet The Spy ____
The Lion, the Witch and the Wardrobe ____

Appendix 3

Activity Preference Questionnaire

Below you will be given a choice between engaging in one of two activities. Please put a check mark next to the one that you prefer. Please mark only one. That is, even if you like both activities, please mark only the one you like best. Similarly, even if you dislike both activities, mark the one that you would prefer to do. For each item, please mark only one choice.

1. I would rather:
___ listen to music of my choice
___ watch a television program of my choice

2. I would rather:
___ watch a television program of my choice
___ read a book of my choice

3. I would rather:
___ spend time on my hobbies
___ watch a television program of my choice

4. I would rather:
___ read a book of my choice
___ play an outdoor sport of my choice

5. I would rather:
___ listen to music of my choice
___ talk with friends of my choice

6. I would rather:
___ read a book of my choice
___ listen to music of my choice

7. I would rather:
___ play an outdoor sport of my choice
___ attend a movie of my choice

8. I would rather:
___ talk with friends of my choice
___ read a book of my choice

9. I would rather:
___ watch a television program of my choice
___ talk with friends of my choice

10. I would rather:
___ play an outdoor sport of my choice
___ watch a television program of my choice

11. I would rather:
___ attend a movie of my choice
___ read a book of my choice

12. I would rather:
___ read a book of my choice
___ spend time on my hobbies

Appendix 4

Official Definition of Learning Disabilities

(Adopted by the Learning Disabilities Association of Canada on January 30, 2002)

"Learning Disabilities" refer to a number of disorders which may affect the acquisition, organization, retention, understanding or use of verbal or nonverbal information. These disorders affect learning in individuals who otherwise demonstrate at least average abilities essential for thinking and/or reasoning. As such, learning disabilities are distinct from global intellectual deficiency.

Learning disabilities result from impairments in one or more processes related to perceiving, thinking, remembering or learning. These include, but are not limited to: language processing; phonological processing; visual spatial processing; processing speed; memory and attention; and executive functions (e.g. planning and decision-making).

Learning disabilities range in severity and may interfere with the acquisition and use of one or more of the following:

- oral language (e.g. listening, speaking, understanding);
- reading (e.g. decoding, phonetic knowledge, word recognition, comprehension);
- written language (e.g. spelling and written expression); and
- mathematics (e.g. computation, problem solving).

Learning disabilities may also involve difficulties with organizational skills, social perception, social interaction and perspective taking.

Learning disabilities are lifelong. The way in which they are expressed may vary over an individual's lifetime, depending on the interaction between the demands of the environment and the individual's strengths and needs. Learning disabilities are suggested by unexpected academic under-achievement or achievement which is maintained only by unusually high levels of effort and support.

Learning disabilities are due to genetic and/or neurobiological factors or injury that alters brain functioning in a manner which affects one or more processes related to learning. These disorders are not due primarily to hearing and/or vision problems, socio-economic factors, cultural or linguistic differences, lack of motivation or ineffective teaching, although these factors may further complicate the challenges faced by individuals with learning disabilities. Learning disabilities may co-exist with various conditions including attentional, behavioural and emotional disorders, sensory impairments or other medical conditions.

For success, individuals with learning disabilities require early identification and timely specialized assessments and interventions involving home, school, community and workplace settings. The interventions need to be appropriate for each individual's learning disability subtype and, at a minimum, include the provision of:

- specific skill instruction;
- accommodations;
- compensatory strategies; and
- self-advocacy skills.