Predicting Risk for Oral and Written Language Learning Difficulties in Students Educated in a Second Language [1]

Caroline Erdos[2], Fred Genesee[2], Robert Savage[2] and Corinne Haigh[3]

[2]McGill University, [3]Bishop University

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Abstract

The extent to which risk for French-as-a-second-language (L2) reading and language learning impairment are distinct and can be predicted using first language (L1) predictors was examined in English-speaking students in total French Immersion (FI) programs. 86 children were tested in Fall of kindergarten (K), Spring K, and Spring Grade 1 using an extensive battery of L1 predictor tests (in K) and L2 outcome tests (in Grade 1). Analyses of the K predictor scores revealed distinct underlying components, one related to reading and one to oral language. Further analyses revealed that phonological awareness (PA), phonological recoding, and letter-sound knowledge in L1 were significant predictors of risk for reading difficulties in L2 while performance on L1 sentence repetition, PA, and tense marking tests in K were the best predictors of risk for L1 and L2 oral language difficulties. Both Fall- and Spring-K predictors predicted Grade 1 outcomes to a significant extent, with the Spring-K predictors being more accurate. These results provide support for distinctive risk profiles for L2 oral language and reading difficulty and, furthermore, argue that assessment of L1 abilities can be used to make reasonably accurate predictions of later reading and/or oral language learning difficulties in L2 students.

Introduction

Language impairment and reading impairment are two of the leading causes of academic failure (Dockrell, Lindsay, & Palikara, 2011). Early identification of risk for reading and language impairment is important to provide early intervention in order to reduce the incidence of subsequent reading, language, and other academic difficulties (Buschmann, Jooss, Feldhusen, Pietz, & Philippi, 2009; Scanlon, Anderson, & Flynn, 2008). The purpose of the present study was to examine risk for reading and language impairment in students educated in a second language (L2). The early identification of L2 students who are at risk for reading and/or language impairment is complicated because these students are usually still in the process of acquiring the language of instruction and, thus, indications of underperformance in language or reading could reflect their incomplete acquisition of the L2 rather than an underlying impairment related to language or reading acquisition (Paradis, Genesee, & Crago, 2010). An alternative identification strategy is to use diagnostic tests in the students' first language (L1) to predict risk. A goal of the present study was to examine the utility of such an approach. An additional goal was to examine whether risk for reading and language impairment comprise different risk profiles, a point we return to later.

Our focus was on majority language English-speaking students attending early total French Immersion (FI) programs in which all instruction, including reading instruction, was provided in French, their L2, during Kindergarten (K) and Grade 1. In these programs, English is introduced as a language of instruction only in Grade 2 and is gradually increased in subsequent grades such that by the end of Grade 6 students have completed 70% of their course work in French and 30% of their course work in English. While the students in the current study spoke the majority language of the broader community in which they were living (viz. Canada), education through an L2 is even more common among students who speak a minority language by virtue of being immigrants (e.g., Turkish-speaking children whose families have immigrated to Germany) or being raised in families in which a minority language is used in the home (e.g., Spanish-speaking children living in the U.S.). We refer to all such learners in the remainder of this article as L2 students, but acknowledge there may be both similarities and differences in the risk profiles of different types of L2 learners. Since the goal of the present study was to examine the feasibility and utility of using L1 indicators of risk for reading and language impairment to identify L2 students who are at risk, we review research that has examined predictors in L1 as well as L2 students in each domain.

Dyslexia

Developmental dyslexia or specific reading impairment is a neurologically-based condition characterized by difficulty with accurate and/or fluent word recognition and poor decoding and spelling that are not due to limited intellectual ability, sensory deficit(s), or inadequate instruction (Lyon, Shaywitz, & Shaywitz, 2003) and is estimated to affect between 5% and 20% of school age children (Shaywitz, 2003); it is a persistent impairment that individuals do not outgrow. It is thought to have a genetic component (Shaywitz & Shaywitz, 2005) and, unlike primary language impairment (PLI), to be discussed shortly, the incidence of dyslexia does not differ for boys and girls (Shaywitz, Shaywitz, Fletcher, & Estabar, 1990). Poor reading comprehension and reduced vocabulary and background knowledge are generally thought to be secondary consequences of dyslexia (International Dyslexia Association, 2007).

Extensive research on monolingual children, primarily English speakers, indicates that children with dyslexia have poor phonological processing skills and limited knowledge of the alphabetic principle (e.g., Bowey, 2005; Lonigan, Burgess, & Anthony, 2000; Schatschneider, Fletcher, Francis, Carlson, & Foorman, 2004). With respect to phonological processing, three domains have been examined: phonological awareness (PA), phonological access or recoding, and phonological memory. While there is evidence that all three are linked to decoding ability in general and to dyslexia in particular, PA has been found to be the most significant and consistent predictor, at least in the case of languages with deep orthography such as English, as much as 2 to 5 years later (for a review, see National Institute for Literacy, 2008). It has been found that decoding abilities of monolingual children with dyslexia improve significantly following systematic and explicit instruction in letter-sound knowledge and PA, arguing that phonological processing, and PA in particular, are causally and not just statistically related to word decoding and, thus, are at the core of dyslexia (NICHD, 2000).

Reading comprehension and difficulties with reading comprehension have been less extensively studied than decoding. Most researchers agree that reading comprehension is dependant upon a range of abilities that, in addition to decoding, include vocabulary, syntax, working memory, and the ability to make inferences, integrate information, and understand story structure (e.g., Cain & Oakhill, 1999; Oakhill, Cain, & Bryant, 2003; Waltzman & Cairns, 2000). In contrast to the results of studies on word decoding where the same predictors of individual differences in and risk for reading difficulty have been found to remain significant (in both concurrent and prospective prediction studies) throughout the elementary grades, findings from studies on reading comprehension indicate that predictors that are most significant in the early stages of learning to read may lose their importance and be replaced by different predictors later. More specifically, the work of Storch and Whitehurst (2002), for example, provides evidence that oral language skills play an important role with respect to reading comprehension in grades 3 and 4, but the role of oral language is weak to the point of not being statistically significant in grades 1 and 2. Presumably, Storch & Whitehurst's findings are the result of the importance of phonological processing and print knowledge for decoding when reading relatively simple text as compared to oral language abilities that are necessary for comprehending complex text.

While most reading comprehension difficulties are linked to word decoding difficulties, there is growing evidence of and interest in readers with deficits in reading comprehension but whose difficulties are not or are less significantly related to difficulties with word decoding (e.g., Cain, Oakhill, Barnes, & Bryant, 2001; Catts, Adlof, & Ellis Weismer, 2006). While some researchers believe that these *poor comprehenders* have difficulties with reading comprehension specifically, and not with (oral) listening comprehension (Bishop & Snowling, 2004), others have proposed that poor comprehenders may have oral language skills that are sub-clinically deficient, i.e., too mildly impaired to be diagnosed as a clinical language impairment (Catts et al., 2006). Indirect support for this view comes from evidence that poor comprehenders typically do not have phonological processing difficulties (Catts et al., 2006; Wong, Kidd, Ho, & Au, 2010). If indeed poor comprehenders also have sub-clinically impaired language abilities, one would expect that predictors of risk for language impairment would also predict reading comprehension difficulties. Our understanding of poor comprehenders is limited at present and, thus, there is a need for further detailed investigations of this population. The extent to which reading and oral language difficulties overlap in L2 learners was explored in the present investigation.

With respect to individual differences and risk for reading difficulties in L2 students, there is evidence that the same components of letter-sound knowledge and phonological processing, and especially PA, are equally important in predicting L2 decoding ability and difficulty. Specifically, there are significant correlations between L1 and L2 phonological processing abilities, and again especially PA, and between L1 and L2 word reading ability (e.g., Chiappe, Siegel, & Wade-Woolley, 2002; Riches & Genesee, 2006). Of particular relevance to the present study, research on English-speaking students in the primary grades of early FI has revealed significant positive correlations between scores on English and French word decoding tests and, consistent with studies of individual differences in L1 reading acquisition, that phonological processing skills, and especially PA, are significant predictors of word decoding outcomes. Moreover, these relationships are evident cross-linguistically as well as intra-linguistically; thus, English-L1 phonological processing abilities are significantly correlated with French-L2 decoding abilities (Bournot-Trites & Denizot, 2005; Comeau, Cormier, Grandmaison, & Lacroix, 1999; Geva & Clifton, 1994; Eagan & Cashion, 1988; Jared, Cormier, Levy, & Wade-Woolley, 2011; MacCoubrey, Wade-Woolley, Klinger, & Kirby, 2004).

There is also evidence, albeit limited at present, that L1 reading comprehension is significantly correlated with L2 reading comprehension (e.g., Reese, Garnier, Gallimore, & Goldenberg, 2000). In addition, and as has been found for reading comprehension in English-L1 students, reading comprehension in English-L2 students depends on diverse language skills in addition to decoding (e.g., Reese et al., 2000), including, as noted in August and Shanahan (2006): vocabulary (e.g., Dufva & Voeten, 1999; Carlisle, Beeman, Davis, & Spharim, 1999); oral proficiency (e.g., Peregoy, 1989; Verhoeven, 1990, 2007); listening comprehension (Royer & Carlo, 1991); and knowledge of text structure (Goldstein, Harris, & Klein, 1993; Peregoy & Boyle, 1991). In their longitudinal study of FI students in Canada, Jared et al. (2006) found that non-verbal IQ, receptive grammar, and PA, all assessed in English in spring of K, were the best predictors of Grade 3 French reading comprehension, in this order of importance. Students' knowledge of French (i.e., vocabulary) at K entry did not correlate significantly with reading outcomes, arguably because these students had had so little exposure to French that there was insufficient variance in their French abilities for significant correlations with later reading abilities to emerge. These students were attending programs in predominantly English-speaking cities. In the only study of at-risk readers in L2 immersion programs that we know of, Bournot-Trites and Denizot (2005) found that K and Grade 1 immersion students who were considered at risk for reading difficulty in French according to their performance on a battery of French language tests (including knowledge of letter names, PA, and word and non-word repetition) were also identified as at risk based on their performance on a similar battery of English language tests.

Primary Language Impairment

PLI, more commonly referred to as Specific Language Impairment (SLI), is a developmental language disorder characterized by a marked impairment in oral language relative to age expectations that is not due to frank sensory-motor, neurological, socio-emotional, or non-verbal cognitive deficits (Rice, 2007). PLI has been estimated to affect 3 to 10% of K children (Tomblin, Records, Buckwalter, Zhang, Smith, & O'Brien, 1997) and more boys than girls (Law, Boyle, Harris, Harkness, & Nye, 2000). PLI is thought to be genetically based (Bishop, Adams, & Norbury, 2006).

Any area of language—morphosyntactic, lexical, semantic, or pragmatic—can be affected alone or in combination in individuals with PLI. While there is ongoing debate about the fundamental nature of the deficits that underlie PLI and its causes (e.g., Elin Thordardottir & Namazi, 2007; Windsor & Kohnert, 2009), for purposes of the present study, we focused on morphosyntax because there is considerable evidence that impairment in this domain is a salient characteristic of children with PLI (e.g., Anderson & Lockowitz, 2009; Goffman & Leonard, 2000; Rice, 1999), especially among English-speaking children. In fact, the specific morphosyntactic difficulties experienced by children depend on the grammatical properties of their language (Paradis, Crago, Genesee, & Rice, 2003; Restrepo & Gutierrez-Clellen, 2001; Rice & Wexler, 1996). In particular, research on English-speaking children with PLI indicates that they have significant difficulties with tense and verb agreement morphology and, thus, these are often taken by some to be clinical markers of PLI in English-speaking children (e.g., Paradis et al., 2003; Rice & Wexler, 1996). For example, the Test of Early Grammatical Impairment (TEGI), developed by Rice and Wexler (2001) and used in the present study, was developed as a diagnostic tool to identify English-speaking children with PLI; psychometric analyses of this instrument indicate considerable sensitivity and specificity for ages 3 to 8 years. Findings from studies that have sought to predict language impairment in monolingual children indicate that tests of expressive morphosyntax are indeed significant predictors of significant and persistent language difficulties (e.g., Paradis & Crago, 2001; Rice & Wexler, 1996; Simon-Cereijido & Gutierrez-Clellen, 2007).

Children with PLI in English (e.g., Archibald & Joanisse, 2009; Conti-Ramsden & Faragher, 2001), and in other languages (e.g., Stokes & Fletcher, 2003, for Chinese), have also been shown to exhibit deficits on tests of verbal memory, including non-word repetition (e.g., Botting & Conti-Ramsden, 2001; Graf Estes, Evans, & Else-Quest, 2007), which are generally thought to depend on phonological short-term memory and/or phonological working memory (Baddeley, Gathercole, & Papagno, 1998), and on tests of sentence repetition, which are thought to depend on both long- and short-term components of verbal memory (e.g., Alloway & Gathercole, 2005; Jefferies, Patterson, Jones, Bateman, & Lambon Ralph, 2004) and possibly other linguistic processes (Jefferies et al., 2004). In comparative studies of the predictive accuracy of each type of task, both Archibald and Joanisse (2009) and Botting and Conti-

Ramsden (2001) found that sentence repetition was a more significant concurrent predictor of PLI in English-L1 speakers than was non-word repetition; thus, sentence repetition was used as a predictor of risk for language impairment in the present study.

Studies of oral language impairment in monolinguals have looked at concurrent predictors (e.g., Archibald & Joanisse, 2009; Simon-Cereijido & Gutierrez-Clellen, 2007) as well as prospective predictors (e.g., Ellis Weismer, 2007; Rice, Taylor, & Zubrick, 2008). However, few prospective studies (except see Dale, Price, Bishop, & Plomin, 2003; Thal, 2005a, 2005b) have considered the predictive value of the wide range of identified predictors simultaneously and yet this information is critical when making decisions regarding service delivery. Our study examined prospective rather than concurrent predictors of risk, thereby laying the groundwork for early intervention. Furthermore, we examined the positive and negative predictive value of (positive) or not-at-risk (negative).

Far fewer studies have examined correlates of language impairment in children who learn more than one language, be they simultaneous bilinguals or successive bilinguals (i.e., L2 learners). Moreover, extant research has focused on concurrent predictors; we are not aware of any research that has examined prospective predictors of language impairment in learners who are still in the process of acquiring the L2 – a goal of the present study. Gutierrez-Clellen and Simon-Cereijido (2007, 2010) and Paradis et al. (2003) examined the specific morphosyntactic deficits of Spanish-English and French-English simultaneous bilinguals, respectively, who had been diagnosed with PLI. Both groups of researchers found that these children exhibited the same profile of language-specific deficits (and strengths) in each language as children with PLI who were learning these languages monolingually. Studies of successive bilinguals with PLI have similarly shown that they exhibit patterns of deficits in their L2 that are similar to those of monolingual native speakers of those languages (Paradis, 2008, 2010; Rothweiler, Chilla, &

Babur, 2010). This is not to say that there may not be differences between bilingual and L2 learners with PLI and monolinguals; but, rather to emphasize that there are sufficient crosslinguistic similarities to justify a prospective predictive approach. In a related vein, it is generally argued that bilingual individuals with language impairment demonstrate impairment in both languages and that identification of bilingual and L2 children who might be affected by PLI should include assessments in both languages to confirm that their language difficulties are symptomatic of an underlying impairment and not due to loss of the L1 or incomplete acquisition of the L2 (e.g., Bedore & Pena, 2008; Paradis et al., 2003).

Distinctiveness of Dyslexia and PLI

Evidence indicates that intervention for children with reading and/or language impairment is most effective when it focuses on individual children's specific deficits (e.g., Girolametto, Weitzman, & Clements Baartman, 1998; Mathes, Pollard-Durodola, Cardenas-Hagan, Linan-Thompson, & Vaughn, 2007; Vaughn et al., 2008). Thus, an additional goal of the present study was to examine the extent to which risk for reading and language impairment are distinct in L2 learners. There has been a longstanding debate about whether language and reading impairment comprise distinct, the same, or overlapping impairments (e.g., Bishop & Snowling, 2004; Messaoud-Galusi & Marshall, 2010). Some researchers argue that reading and language impairment are different manifestations of the same underlying processing deficit (e.g., Corriveau, Pasquini, & Goswami, 2007; Kamhi & Catts, 1986; Rispens & Been, 2007); others maintain that they are different disorders with different underlying deficits (e.g., Catts, Adlof, Hogan, & Ellis Weismer, 2005; de Bree & Kerkhoff, 2010; Nation & Snowling, 1998); and yet others view them as similar but different disorders where deficits that underlie one disorder place a child at risk for the other disorder (e.g., Bishop & Snowling, 2004; Pennington & Bishop, 2009; Fraser, Goswami, & Conti-Ramsden, 2010). Phonological deficits, more specifically the question of whether they are present or absent in individuals with PLI or dyslexia, has been at the heart of this debate.

Some studies on the overlap in PLI and dyslexia have prospectively examined the reading abilities of children identified early on with language impairment (e.g., Botting, Simkin, & Conti-Ramsden, 2006; Silva, McGee, & Williams, 1983; Vandewalle, Boets, Ghesquière, & Zink, 2010); others have retrospectively examined the early language abilities of older children with dyslexia or of children with a family history of dyslexia (e.g., McArthur, Hogben, Edwards, Heath, & Mengler, 2000; Scarborough, 1990, 1991; Share, Silva, & Adler, 1987;); yet others have concurrently examined the language and reading abilities of children with PLI and/or dyslexia or with a personal or family history of PLI or dyslexia (e.g., de Bree & Kerkhoff, 2010; Fraser et al., 2010; Wong et al., 2010). These methodologies create a bias in favour of finding evidence of co-morbidity of reading and language impairment because they are based on samples that are selected, at least for one or the other disability. Relatively few studies have examined the incidence of language and reading impairment or difficulty in non-selected samples prospectively (but, see Catts et al., 2005; Silva et al., 1985). Using non-selected samples, as was done in the present study, makes it possible to ascertain more accurately the prevalence of reading and language impairment occurring separately or together.

Of the studies that have used non-selected samples, only Catts et al. (2005) compared children with dyslexia only and children with PLI only. They found that when dyslexia was defined in terms of poor word decoding abilities with normal full scale IQ, about 20% of K children with PLI met the criteria for dyslexia in Grades 2, 4, and 8, in comparison to the base rate of dyslexia of 8.6% in their total sample of 527 children. They also found that approximately 15% of children identified as having dyslexia in Grades 2, 4, or 8 also met the criteria for PLI in K, as compared to the usual base rate of PLI of approximately 5 to 7% in the general school-aged population (Law et al., 2000; Leonard, 1998; Tomblin et al., 1997). Catts et al. argued that "Whereas dyslexia and SLI may best be viewed as distinct disorders, they appear to be comorbid in some children" (p.1392). They go on to propose that one would expect a particularly high incidence of comorbidity in clinical populations because of the severity of their disorder(s) and much lower incidence of comorbidity in non-clinical populations. Unfortunately, language skills were not reassessed after K and pre-reading/reading skills were not assessed in K, making it impossible to determine the extent to which both oral and written language deficits may have co-existed in this sample at the outset or at the end of the study.

Catts and his colleagues also examined whether and to what extent children with either PLI only, dyslexia only, or PLI and dyslexia had phonological processing difficulties, in comparison to children who were typically developing. Phonological processing was assessed in K and Grade 4 using measures of PA. Surprisingly, and contrary to the results of numerous other studies (e.g., Fraser et al., 2010), children with PLI only performed significantly better than children with dyslexia only or children with PLI and concomitant dyslexia on these tasks. In fact, the children with PLI only did not differ significantly from controls in phonological processing abilities, leading the authors to argue that an underlying phonological deficit did not account for the overlap across these two clinical populations (see also Eisenmajer, Ross, & Pratt, 2005). These findings are very similar to those of Kelso, Fletcher, and Lee (2007) who found that 7-to 9-year-old children with PLI who were good decoders performed within normal limits on PA tasks. Again, language skills were not assessed after K in Catt et al.'s (2005) study, potentially masking cases who may have had language impairment but, as a result of K testing that did not fully tap into areas of difficulty, went undetected early on.

A second related finding involving Catt et al.'s (2005) cohort was reported by Tomblin, Zhang, Weiss, Catts, and Ellis Weismer (2004). Factor analysis of all participants' language scores at age 7 indicated that phonological processing tasks loaded on a different factor than oral language tasks, indicating that these abilities vary independently of one another and, thus, that children could have difficulties in only one of these areas (i.e., phonological processing only or oral language only).

In contrast, most studies that have investigated the role of phonological processes in PLI only and dyslexia only suggest that phonological processes are significantly depressed in both clinical groups. For example, Fraser et al. (2010) compared 9- to 11-year-olds with PLI, dyslexia, or PLI and dyslexia and found that all three groups displayed impairments on their phonological tasks. The PLI and dyslexia groups differed primarily with respect to their performance on non-phonological language tasks. Interestingly, Fraser et al. drew their sample from mainstream elementary schools and, as such, one would expect that the children would perhaps be less severely impaired than children drawn from specialized learning disability clinics (e.g. Eisenmajer et al., 2005) and consequently less likely to manifest significant specific difficulties. Some researchers suggest further that certain predictors take on different levels of importance within specific risk groups; for example, Vandewalle et al. (2010) suggest that phonological abilities may not be predictive of dyslexia in children with SLI.

There are no studies that we know of that have examined overlap in reading and language impairment in L2 learners, the focus of the present research.

The Present Study

The present study is part of a longitudinal investigation of L2 reading and oral language development in English-speaking students in an early total FI program. Of particular relevance to the present study, initial reading instruction in this program was exclusively in French in K and Grade 1;

the reading curriculum in these grades reflected a balanced approach with both phonics and whole language features. An earlier report focused on individual differences among this group of students in word decoding and early reading comprehension skills in French-L2 at the end of Grade 1 (Erdos, Genesee, Savage, & Haigh, 2011). The present study focuses on Grade 1 students who are deemed to be at risk for L2 reading and/or oral language difficulties.

The specific questions addressed were: (1) Are the risk profiles for reading and language difficulties in L2 students the same or different and in what ways? (2) Can risk for reading and language learning in an L2 be predicted prospectively using L1 predictors? and (3) How early in schooling can significant predictions of risk for each type of disability be made using L1 predictors? To address these issues, we conducted principal component analyses of the scores on the predictor tests administered in K to determine if the underlying structure of performance on these tests was differentiated according to risk for reading-related versus language-related difficulties. As well, we carried out discriminant function analyses using L1 predictors, administered in K, of at-risk and not-at-risk reading and language subgroups based on their performance on L2 outcome tests administered at the end of Grade 1. Since the K predictor tests were administered in English, the students' L1, we were able to determine if L1 predictors can predict risk for L2 reading and language learning up to two years later; and since the English-L1 predictor tests were administered in both the Fall and Spring of K, it was possible to determine the relative accuracy of the Fall versus Spring predictions of later risk. By comparing predictions of risk for reading versus language difficulties, we were able to determine the extent to which risk for each is distinct.

Throughout the remainder of this article, we use the term “difficulty” in lieu of “impairment” when referring to poor oral language and reading performance by the at-risk children because “impairment” denotes difficulties of a clinical nature, and it may be premature to confidently identify these L2 students as clinically impaired. The below average children in this study, nevertheless, can be considered *at risk* for impairment in reading or language because they meet the primary inclusionary criterion for impairment; namely, performance on a reading or language test that falls below one standard deviation of the mean. Moreover, they do not appear to meet any exclusionary criteria, such as significantly low general intelligence or sensory/emotional/neuro-cognitive impairments. Nevertheless, it must be kept in mind that the "at-risk L2 students" in this study could have clinical or non-clinical levels of difficulty.

Method

Participants

The children participating in this study were attending an early total FI program in a suburban community outside Montreal. As noted earlier, all K and Grade 1 instruction, including reading, was conducted in French by native French-speaking teachers. The reading curriculum included features of both whole language and phonics approaches. The geographical area served by these schools includes primarily French-speaking families, but there are numerous pockets of English-speaking and bilingual (French and English) families as well; the families represent a range of socio-economic backgrounds. These schools were selected because they included a relatively high proportion of children who were learning French as an L2. Parents whose children were about to begin K attended a meeting with the research team and permission was sought to include their child in the study if the child was monolingual English or dominant in English with some ability in French. Only children whose language exposure at home and in the community was only or primarily in English were included to ensure that they were all still in the process of acquiring French; some minimal exposure to French is likely in the case of all students. Most parents who did not volunteer to participate in the study did so because their child did not qualify. Children with developmental or acquired disorders other than reading or oral language impairment were excluded (e.g., autism spectrum disorders, Down's syndrome). Written consent was initially obtained for 90 K children from the immersion program, although 4 children discontinued (2 children moved, 1 child switched from immersion to core English, and consent was not received in Grade 1 for one child). The remaining 86 (50 girls) children completed K and Grade 1 testing. These children were in 12 classrooms in 7 schools.

The children whose parents who agreed to participate were classified as monolingual English or English-dominant based on: (a) information provided by parents in response to a questionnaire (see *Parent Questionnaire*) about language exposure at home and in daycare; (b), scores on standardized French (EVIP) and English (PPVT) receptive vocabulary tests administered in Fall K (see description of *EVIP* and *PPVT* below); and (c) testers' impressions following initial meetings with each child. Overall, the children's average standard score was 106 on the PPVT and 73 on the EVIP. In Fall K, the children ranged in age from 4 years 9 months to 6 years with a mean age of 5 years 6 months. According to our questionnaire results, the mean number of years of the mother's education was 14 years (a college degree--i.e., one or two years of education after high school). This is comparable to the Canadian average of 13.2 years (Statistics Canada, 2006). Closer inspection of the data indicated that there was a bimodal distribution, with peaks at college degree and bachelor's degree; the range was secondary 5 to doctoral level. All testing was conducted individually in a quiet room in each child's school.

Materials

Various control tests were administered to all children in Fall K. Language and reading-related predictor tests were also administered in Fall K (Time 1) and again in Spring K (Time 2). Administering the predictor tests twice during K allowed us to compare the accuracy of predictions made at the beginning versus the end of K. The selection of the predictor tests was based on our preceding review of the relevant research and on practical considerations. Language and reading-related outcome measures were administered to all children in Spring Grade 1 (Time 3), almost two full school-years after the first administration of the predictor tests. Table 1 provides a summary of the tests administered at each time point. A questionnaire was completed by all parents in Fall K. A brief description of all tests and the questionnaire follows.

Questionnaires. Parents were asked to complete a questionnaire at Time 1 about language background, family history, socio-economic status, and the child's health, developmental milestones, and exposure to reading and books. Questionnaire information was used to aid in the identification of language dominance, socio-economic level, and pre-existing developmental or acquired disorders.

Control measures. The following control measures were administered individually to each child at Time 1: hearing screening, vision screening, and non-verbal cognitive ability.

Hearing screening was conducted using a calibrated, portable audiometer. Under earphones, hearing was tested in each ear separately at 500, 1000, 2000, and 4000 Hz. To pass the hearing screening, children had to reliably respond at a minimum of 20 dB at 1000, 2000, and 4000 Hz, in at least one ear. All children passed the hearing screening.

Vision screening was conducted using the Rosenbaum Pocket Vision Screener ©, a near vision visual acuity screener based on the Snellen eye chart. Each child had to identify letters and numbers presented at a distance of 14 inches, one eye at a time. To pass, the child had to correctly name at least all but two items in one row at an acuity level of 20/30 or better, in each eye. Vision screening was postponed until Time 2 or, if necessary, Time 3, if a child could not reliably identify letters or numbers that comprised the test. One child failed the vision screening;

he was retained in our study because he was fitted with glasses as soon shortly after our screening.

Non-verbal cognitive ability was assessed individually using the *Coloured Progressive Matrices* (CPM; Raven, Raven, & Court, 1998). Each child was required to look at a visual pattern and determine which of six individual pieces best completed the test pattern. Internal reliability is reported to range from r = .70 to r = .80. No child had below-average performance on this measure.

Language-related predictor tests. Oral language skills which were used as predictors were assessed using tasks of vocabulary, grammar, and sentence repetition. All of these tests, except the PPVT, were administered in Fall and Spring of K.

The *Peabody Picture Vocabulary Test* – III (PPVT-III; Dunn & Dunn, 1997) was administered only at Time 1 to assess English receptive vocabulary. As per standard administration, each child was required to point to the picture from a plate of four pictures that best represented a word spoken by the examiner. Internal reliability for this test is reported to be r = .94. The *Échelle de vocabulaire en images Peabody* (EVIP; Dunn, Thériault-Whalen, & Dunn, 1993) was administered to assess French receptive vocabulary. The EVIP is a standardized French adaptation of the PPVT-R. Internal reliability is reported to be r = .82.

The ability to recall and repeat increasingly long and grammatically-complex sentences in English was assessed using the Recalling Sentences subtest of the *Clinical Evaluation of Language Fundamentals*-4 (CELF-4; Semel, Wiig, & Secord, 2003). The Recalling Sentences subtest of the CELF is widely used to identify English-speaking children with language impairment (e.g., Archibald & Joanisse, 2009). At age 5 and 6, internal reliability is reported to be above .90. As per standard test administration, children were required to repeat increasingly long and grammatically-complex sentences without altering meaning or grammar. Up to three points could be deducted per sentence for recall errors.

Expressive grammar in English was assessed using the *Test of Early Grammatical Impairment* (TEGI; Rice & Wexler, 2001). Two subtests of the TEGI were administered: third person present tense and past tense (regular and irregular). These were selected because difficulties with verbal morphology are characteristic of English-speaking children with SLI (Paradis et al., 2003). As per standard test administration, the child is prompted, with the help of pictures and verbal models, to produce *subject + verb* (present or past tense) phrases (e.g., “Here, the girl is skating. Here, she is finished. Tell me what she did.”). Full credit is given if the verb is correctly marked for tense, otherwise, a score of zero is given. The TEGI was designed to identify risk for oral language impairment in English among 3- to 8-year old children. Stability coefficients range from $r = .82$ to $r = .95$.

Reading-related predictor tests. The tests used to predict risk for Grade 1 reading outcomes assessed phonological processing, letter-sound/letter-name knowledge, and decoding in English. These tests were administered in both Fall and Spring of K.

Phonological processing was assessed using tasks that examine PA, phonological access, and phonological memory. PA was assessed at Time 1 and Time 2 using an experimental English blending task, a measure that assesses the ability to combine sounds to form real words (Comaskey, Savage, & Abrami, 2009). Children were auditorily presented with two or three isolated syllables comprised of a consonant followed by a vowel (cv: “t-ea”), a vowel followed by a consonant (vc: “ea-t”), or a consonant followed by a vowel and a consonant (cvc: “b-ea-t”), and were asked to put them together (i.e., blend) to make a word. Each syllable was phonologically balanced across syllable conditions (e.g., tea-eat-beat). One point was given for each correct answer, for a maximum score of 9 points. Inter-rater reliability was $k = .99$ (T1) and $k = .92$ (T2). The Spearman-Brown reliability was $r = .92$ (T1) and $r = .94$ (T2).

Phonological access was also assessed at Time 1 and Time 2 using the Rapid Automatized Naming and Rapid Alternating Stimulus Tests (RAN/RAS; Wolf & Denckla, 2005; original English version). Children were required to rapidly name a series of objects, colours, letters, numbers, and a combination of letters, numbers, and colours. There is evidence that alphanumeric naming is closely associated with decoding accuracy and quite specifically with fluency (e.g. Savage & Frederickson, 2005), while non-alphanumeric naming may be more closely associated with general language deficits (e.g., Catts, Gillespie, Leonard, Kail, & Miller, 2002) or attention problems (e.g., Purvis & Tannock, 2000). Since fluency was not one of the outcome variables in the present study, only results for the non-alphanumeric (objects) subtest were included in our analyses. The score corresponded to the total number of seconds within which each test plate was completed by the child. Each subtest was administered only if the child could independently name the 5 practice items of each subtest (e.g., the number test plate was only administered if the child could independently name the 5 different numbers that appeared on this plate). Test-retest reliability is reported to range from $r = .81$ to $r = .98$.

Letter-sound knowledge was assessed in English at Time 1 and in French at Time 2. The same letters were assessed in the same random order in English and in French. Each child was presented with 23 uppercase letters printed in large font on a cue card and asked to produce the sound made by each letter (the letters *k*, *b*, and *y* were practice items). One point was given for each correct answer, for a maximum total of 23 points. The Spearman-Brown internal reliability was $r = .90$ (English) and $r = .91$ (French).

Letter-name knowledge in English was assessed at Time 1 and at Time 2 using the *Wide Range Achievement Test*-3: blue reading subtest (WRAT-3; Wilkinson, 1993), a measure of a child's ability to recognize and name letters. Children were asked to name 15 uppercase letters. One point was given for each correct answer, for a maximum total of 15 points. Median test coefficient alphas ranged from r = .82 to .95. Letter-name knowledge in French was assessed at Time 1 and at Time 2 using a French adaptation of the *Wide Range Achievement Test*-3: letter identification section of the blue reading subtest (WRAT-3; Wilkinson, 1993). Children were asked to name 15 uppercase letters. Inter-rater reliability was k = .96 (T1) and k = .94 (Time 2) and the Spearman-Brown reliability was r = .94 (T1) and r = .96 (T2).

Word decoding in English was assessed at Time 1 and Time 2 using the *Wide Range Achievement Test-3*: word identification section of the blue reading subtest. Children were asked to read as many words as possible from a list of 42 type-written, lowercase words. One point was given for each correct answer, for a maximum total of 42 points. Median test coefficient alphas ranged from r = .82 to r = .95.

Tests of reading outcomes. Pseudoword decoding in French was assessed at the end of Grade 1 (Time 3) using the *Wechsler Individual Achievement Test-Second Edition: French-Canadian* (WIAT-II^{CDN}; Wechsler, 2005; original French version). Only the pseudoword identification subtest (*Décodage de pseudo-mots)* was administered, and not the word decoding subtest, because the former is not confounded with vocabulary knowledge and, thus, is regarded as a "purer" measure of decoding. Pseudo-word identification involved reading pseudo-words out loud accurately. Full points were given for each word read accurately. Testing was discontinued after 7 consecutive errors. Reliability coefficients for this subtest are reported to be r = .97.

Reading comprehension was assessed at Time 3 using the *Batterie d'échelles multidimensionnelles pour l'évaluation de la lecture* (BEMEL; Cormier, Desrochers, & Sénéchal, 2006, original French version), an experimental measure of reading achievement in French. Only the word comprehension and sentence comprehension subtests were administered. For word comprehension, each child read 30 single words (e.g., "banane" [banana]), one at a time, and pointed to the picture of the category that the word belonged to (body part, clothing, bird, fruit, or colour). For sentence comprehension, the child read 28 sentences ranging from 3 to 11 words in length (e.g., "Jean est couché" [John is lying down]), one at a time, and pointed to the picture that matched the sentence from a set of four pictures. One point was given for each correct answer. The Spearman-Brown reliability was r = .87 (words) and r = .87 (sentences).

Tests of oral language outcomes. Tests of English and French language outcomes were administered at the end of Grade 1, in order to determine each child's language status as at-risk or not-at-risk. Comprehension and recall of abstract linguistic concepts in English was assessed using the *Concepts and Following Directions* subtest of the CELF-4. According to the test developers, this subtest assesses the ability to interpret spoken instructions that contain concepts and to recall specific information in the correct sequence. As per standard test administration, instructions were read out loud and the child was required to respond by pointing to pictures that correspond to the oral descriptions presented by the examiner (e.g., "Point to the ball to the right of a house"). Internal reliability for this subtest is above .90 for ages 6 and 7. Receptive grammar in English was assessed using the *Sentence Structure* subtest of the CELF-4. This subtest evaluates a child's comprehension of syntax. As per standard test administration, children were required to point to one picture among four that best corresponds to a spoken sentence presented by the examiner (e.g., "The first two children are in line, but the third child is still playing.").

Internal reliability for this subtest is reported to be above .70 for ages 6 and 7. French versions of the *Concepts and Following Directions* subtest and the *Sentence Structure* subtest of the CELF-4, adapted by the Department of Speech-Language Pathology of The Montreal Children's Hospital, were also administered at Time 3.

Insert Table 1 about here

Procedure

The battery of predictor tests was administered to each child in October-November of K (Time 1); a second battery of predictor tests was administered in April-May of K (Time 2); and a battery of outcome tests was administered to each child in April-May of Grade 1 (Time 3). At each testing time, the order of test administration was the same for all participants.

Testing conditions. Each session lasted between 20 and 45 minutes, depending on the degree to which the child attended to the tasks, and each child was generally seen only once per day. Sessions were all conducted individually in a quiet room free of distractions. Total number of sessions varied between 4 and 7 per child. French and English tests were not administered on the same day, except if the child had limited French skills, because it was felt that an entire session conducted exclusively in French would leave some children feeling discouraged. The same test was never given in both languages on the same day. Each child was seen by at least two, sometimes three, different examiners over the course of testing. Each assistant was trained and supervised by an experienced and certified clinical speech-language pathologist (CE).

Results

Inspection of the Fall-K data (using the *descriptives* procedure of SPSS to generate *z* scores for each raw score for each test) revealed that the following had skewed distributions: TEGI total (mean of TEGI 3rd person –s and TEGI past tense), English WRAT-3, and CPM. See Table 2 for the means and standard deviations of each test in Fall K. Distributional normality was achieved by applying a square root transformation (English WRAT-3), reversing the scores and applying a square root transformation (TEGI total), or reversing the scores and applying a natural log transformation (CPM). The TEGI total, the English WRAT-3, and the CPM each contained between one and three outliers (> |3.0| SD). Despite applying the above transformations, one outlier remained among the CPM scores (z = + 3.11) and two remained among the English WRAT-3 scores (z = -3.37, z = -3.37). These outlier data were kept in the analyses reported here since results did not differ when they were removed. It was further noted that there was an elevated rate of zero scores for the English cvc blending task, indicating that this task may have been too challenging for many children. We, therefore, recoded all blending task scores as binary categorical scores -- children who were unable to blend at least one item were given a code of 1 and those who succeeded at blending at least one item were given a code of 2. Only blending-vc was entered into our analyses because regression analyses including blending cv and cvc revealed that they did not contribute significantly to the prediction of reading scores beyond the variance accounted for by blending-vc scores.

Inspection of the Spring-K data revealed that the TEGI total, the English WRAT, and the Objects subtest of the RAN/RAS had skewed distributions. See Table 2 for the means and standard deviations of each test in Spring K. Distributional normality was achieved by reversing the scores and applying: a square root transformation (TEGI total), a natural log transformation (Objects subtest of RAN/RAS), or a square root transformation only (English WRAT). The TEGI total, the English

WRAT, and the Objects subtest of English RAN/RAS contained between one and three outliers each. Despite applying transformations, one outlier remained among the TEGI total scores (*z* = +3.62) and the Objects subtest scores of the RAN/RAS (*z* = +3.84). Again, analyses with and without the outliers did not differ and, therefore, analyses including the outliers are reported here. Once again, it was noted that there was an elevated rate of zero scores for the English blending tasks (though less so than in Fall K). We therefore recoded these scores as binary categorical scores, as before. For reasons stated earlier, blending vc was again the only blending subtest entered into the analyses. Subsequent analyses were conducted using both the non-transformed and transformed scores. There was no significant difference in the amount of variance explained or the individual component loadings and, thus, analyses using non-transformed scores are reported for ease of interpretation.

Insert Table 2 about here

Underlying Component Structure of Predictor Tests

In order to first examine whether there are distinct latent variance components for the predictor tests of language and reading development, principal components analyses (PCA) were run separately on the Fall- and Spring-K predictor test scores. With the exception of letter-sound knowledge which was assessed in English in Fall K and in French in Spring K and English receptive vocabulary which was only assessed in Fall K, all measures included in the analyses had been administered in both Fall and Spring K and in English at both times. As per Kaiser's (1960) rule, only components with eigenvalues greater than 1 were retained. Furthermore, given a sample size of 86, we considered only component loadings above the critical value of .560 ($p < .01$, two-tailed) (Stevens, 2002). Results for the Fall-K analysis are discussed first, followed by results using the Spring-K scores.

Fall K

A preliminary sphericity test (Bartlett, 1950) was run, as well as a preliminary measure of sampling adequacy (Kaiser-Meyer-Olkin; Kaiser, 1970). These tests confirmed that the variables were not already uncorrelated, Bartlett: $\chi^2 = 212.842$, df = 28, p = .000; K-M-O sampling adequacy = .786. With the exception of age and IQ, the predictor variables administered in K were retained for the final PCA: English blending, English letter-name knowledge (WRAT-3), English word decoding (WRAT-3), English rapid automatized naming of objects (RAN/RAS-Objects subtest), English sentence repetition (CELF-4-Recalling Sentences subtest), English expressive morphology (TEGI total), English letter-sound knowledge, and English receptive vocabulary (PPVT-IIIA).

PCA of the final list of variables revealed that two (Varimax) rotated components accounted for 58% of the total variance in the Fall-K results. The first component, which accounted for 29% of the variance, included predictor tests related to reading: letter-sound knowledge, blending, letter-name knowledge, and word decoding. The second component, which accounted for an additional 29% of the variance, included tests related to oral language: receptive vocabulary, expressive morphology, rapid automatized naming of objects, and sentence repetition. When age and non-verbal cognitive ability were included in the PCA, the variance accounted for by the first component was reduced to 22 %; and the variance accounted for by the second was reduced to 20 %. Two additional components emerged. The third component accounted for 15 % of the variance and non-verbal cognitive ability and word decoding loaded significantly onto it, and a fourth component accounted for 10 % of the variance and age loaded significantly onto it. No substantive change in the structures of components 1 and 2 resulted. The PCA results were almost identical when Equamax non-orthogonal rotations were applied, further confirming the significance of the components delineated earlier. See Table 3 for results of the Fall-K PCA.

Spring K

Preliminary sphericity test and measure of sampling adequacy confirmed that the variables were not already uncorrelated, Bartlett: χ^2 = 192.744, df = 28, p = .000; K-M-O sampling adequacy = .729. With the exception of English receptive vocabulary (PPVT-IIIA) which was administered only in Fall K, all predictor variables administered in Spring K were retained for the final PCA: English blending, English letter-name knowledge (WRAT-3), English word decoding (WRAT-3), English rapid automatized naming of objects (RAN/RAS-Objects subtest), English sentence repetition (CELF-4-Recalling Sentences subtest), English expressive morphology (TEGI total), French letter-sound knowledge, and English receptive vocabulary (PPVT-IIIA). PCA of the results for these tests revealed two significant (Varimax) rotated components accounting for 57% of the total variance. The first component, which accounted for 30% of the variance, was related to predictors of reading and letter-sound knowledge, blending, letter-name knowledge, and word decoding loaded significantly onto this component. The second component accounted for an additional 27% of the variance and was related to oral language skills; predictor tests of receptive vocabulary, expressive morphology, and sentence repetition loaded significantly onto this component. When age and non-verbal cognitive ability were included in the analysis, the variance accounted for by the first component was reduced to 22 % and word decoding no longer loaded significantly; the variance accounted for by the second component was reduced to 21 %; and an additional third component emerged that accounted for 12 % of the variance and non-verbal cognitive ability loaded significantly onto it. The results were almost identical when Equamax non-orthogonal rotations were applied. See Table 3 for results of the Spring-K PCA.

Insert Table 3 about here

Predicting Difficulty

Having established that there indeed appear to be distinct sets of latent variables among the predictor tests for oral language learning and reading acquisition, discriminant analyses were then conducted to identify the specific K L1-predictor tests that best discriminated between at-risk and not-at-risk subgroups, as determined by the children's end-of-Grade-1 language and reading results in French-L2. A student was classified as "at-risk" if he or she scored more than 1 standard deviation below the mean on the relevant criterion test and "not-at-risk" if he or she scored within 1 standard deviation of the group mean on the criterion test, to be described in the next section. Risk for word decoding difficulty, reading comprehension difficulty, and oral language difficulty were analyzed and are discussed separately. In the case of risk for oral language difficulty, we consider either L1 or both L1 and L2 language performance because most children were still in the early stages of acquiring French by the Spring of Grade 1 and, therefore, we felt that their L2 oral language results alone were insufficient to classify their risk status. This is different from the case of risk for L2 reading difficulty because the students had had reading instruction in K and Grade 1 entirely in their L2, French, making it the more appropriate language for identifying risk for difficulty.

The predictor measures we used have all been found to predict reading and language outcomes in monolingual native speakers, as reviewed in the Introduction (e.g., Botting, Faragher, Simkin, Knox, & Conti-Ramsden, 2001; Schatschneider et al., 2004). The same 8 K predictor tests were used in the discriminant analyses as had been used in the PCA analyses. Each test was entered stepwise into the analysis. A ratio of at least 10 times as many cases as independent variables was maintained throughout our analyses. This is well over the minimum recommendation of 4 to 5 times as many cases to independent variables but below the cut-off of 20 that is recommended for ensuring reliability (Stevens, 2002) and, thus, replication of these results is warranted in the future. At the same time, however, our goal is to uncover models that can be applied to small sample sizes as this is what is most ecologically similar to a classroom setting where teachers and professionals seek to identify a few struggling students among a class of less than 30 students. Separate analyses were run using the Fall-K and the Spring-K predictor scores in order to see if one set of predictors was more accurate. See Table 4 for the results from each analysis. For each outcome, results using the Fall-K predictor tests are discussed first, followed by the results using the Spring-K predictors.

Risk for decoding difficulty

Risk for decoding difficulty was based on performance on the pseudoword decoding test in French (WIAT pseudoword decoding subtest) only, rather than word decoding scores or both pseudoword and word decoding scores, to ensure that risk status was based purely on decoding ability and not on memory of familiar whole words. Using this criterion, the at-risk subgroup was comprised of 9 children (4 boys, 5 girls) (mean standard score of 74.94 and standard deviation of 10.82 as per test norms) and the not-at-risk subgroup was comprised of 77 children (mean standard score of 103.04 and standard deviation of 12.51 as per test norms).

Fall K. The K test of blending in English was a unique and significant predictor of risk for pseudoword decoding difficulty in French, $F(1, 83) = 4.65$, $p = .034$. Using this variable, group membership was predicted with 78% accuracy (i.e., 7 out of 9 children correctly classified) for the at-risk group and with 64% accuracy (49 out of 77 children correctly classified) for the not at-risk group. In other words, sensitivity of English blending in K in predicting French decoding in Grade 1 is 78% and specificity is 64%. Refer to Table 4, column 1.

In order to increase the size of our at-risk group and thereby render our statistical analyses more robust, we ran the analyses a second time, including both children with decoding deficits only and children with decoding and oral language deficits combined in our at-risk decoding group. This increased the number of children in the at-risk decoding subgroup from 9 to 17; more specifically, 9 children had decoding problems only while 8 children had both decoding and oral language difficulties. While this sample is less pure than that used in the previous analysis, it is arguably a more rigorous test of whether risk for decoding and oral language difficulty are distinct because it includes some children with both risk profiles. Despite this, discriminant analysis using this group revealed that reading-related K predictors, specifically, tests of blending, $F(1, 83) = 23.137$, $p = .000$, and rapid automatized naming of objects, $F(2, 82) = 17.332$, $p = .000$, in English were unique and significant predictors of this combined reading risk group. Arguably, rapid automatized naming of objects emerged as a significant predictor of decoding using the Fall-K predictors because our risk group included children who were also at risk for oral language impairment. Recall that rapid automatized naming emerged as a significant variable in the language but not the literacy component in the PCA of the K predictor tests. That rapid automatized naming did not emerge as a significant predictor of risk using the Spring-K predictors could be due to letter-sound knowledge and vc blending skills being so powerful that they overrode rapid automatized naming. In any case, using blending and rapid automatized naming of objects in Fall K, group membership was predicted with 74% accuracy (i.e., 15 out of 17 children correctly classified) for the at-risk group and with 71% accuracy (49 out of 69 children correctly classified) for the not at-risk group. Refer to Table 4, column 2.

Spring K. English blending, $F(1, 84) = 16.873$, $p = .000$, was a unique and significant predictor of risk for pseudoword decoding difficulty in French at the end of Grade 1. Using this predictor, group membership was predicted with 78% accuracy (7 out of 9 children) for the at-risk group and with 81% accuracy (62 out of 77 children) for the not at-risk group. Refer to Table 4, column 3.

We ran the discriminant analysis a second time, including both children with decoding deficits only and children with decoding and oral language deficits combined in our decoding at-risk group (n=17). In this case, English blending, *F*(1, 84) = 86.742, p = .000, and French letter-sound knowledge, *F*(2, 83) = 52.025, p = .000, were unique and significant predictors of this risk profile. Using these two predictors, group membership was predicted with 88% accuracy (15 out of 17 children) for the at-risk group and with 90% accuracy (62 out of 69 children) for the not at-risk group. Refer to Table 4, column 4.

Risk for reading comprehension difficulty

Students' scores on both the French word comprehension and sentence comprehension (BEMEL) tests combined were used to classify risk status. Using this criterion, there were 15 children in the at-risk subgroup and 71 in the not-at-risk subgroup. Of note, all but one of the children at risk for reading comprehension difficulty also met the criterion for risk for decoding difficulty. The same eight predictor tests that had been used in the PCA were retained for these discriminant analyses. We ran the analysis twice, once using the Fall-K predictor scores and once using Spring-K predictor scores.

Fall K. Blending, *F*(1, 83) = 24.728, p = .000, and rapid automatized naming of objects, *F*(2, 82) = 18.519, p = .000, in English were unique and significant predictors of at-risk status for reading comprehension difficulty in French at the end of Grade 1. These two variables predicted group membership with 93% accuracy (14 out of 15 children) for the at-risk group and 75% accuracy (53 out of 71 children) for the not-at-risk group. It seems likely that rapid automatized naming of objects emerged as a significant predictor of reading comprehension in this analysis for the same reasons proposed earlier. Refer to Table 4, column 5.

Spring K. English blending, *F*(1, 84) = 87.224, p = .000, and French letter-sound knowledge, *F*(2, 83) = 64.405, p = .000, were unique and significant predictors of risk for reading comprehension difficulty in French at the end of Grade 1. Using these two tests, group membership was predicted with

93% accuracy (14 out of 15 children) for the at-risk group and with 87% accuracy (62 out of 71 children) for the not-at-risk group. Refer to Table 4, column 6.

Risk for oral language learning difficulty

Risk group membership was based on performance on the CELF-4 *Concepts and Following Directions* subtest and the CELF-4 *Sentence Structure* subtest, both administered in English in the Spring of Grade 1. Risk for L2 language difficulties would normally take into account risk for both L1 and L2 language development since by, definition, language impairment should appear in both languages; otherwise, it is better considered variation in typical L2 development (Paradis et al., 2003). However, using this criterion yielded an L2 oral language at-risk group of only 3 children, making statistical analyses unreliable. Thus, we resorted to identifying an oral language at-risk group based on the students' L1 oral language results at Time 3. This procedure can be justified on the grounds that to be considered at risk for L2 language difficulties, L2 learners would generally also have to be considered at risk for or have L1 language difficulties. In order to have a risk group comprised of at least 10 children, we also included children who were at risk in both L1 oral language and L2 decoding. Thus, our procedure, while not ideal, because it uses L1 oral language results only, nevertheless, subsumes all L2 learners in this study who meet a critical criterion for risk for L2 difficulties, namely risk for L1 difficulties. As was argued above in the case of risk for decoding difficulties, while this sample is less pure than that used in the previous analyses, it is arguably a more rigorous test of whether risk for decoding and oral language difficulty are distinct because it includes children with both risk profiles. This procedure yielded a subgroup of 13 children, which is sufficiently large to produce reliable results using discriminant analysis. More specifically, there were 13 children in the English at-risk subgroup (mean standard score of 86.92 and standard deviation of 6.86 as per test norms) and 73 in the English not-at-risk group (mean standard score of 106.95 and standard deviation of 6.95 as per test norms); 6 children (2 boys, 4 girls) were at risk in L1 oral language only and 7 (6 boys, 1 girl) were at risk in L1 oral language and L2 decoding.

Fall K. Analyses using this at-risk group revealed that sentence repetition, $F(1, 83) = 18.669$, $p = .000$, and blending, $F(2, 82) = 12.621$, $p = .000$, in English assessed in K were unique and significant predictors of risk for English-L1 oral language difficulties at the end of Grade 1 and, thus, by inference also at risk for L2 language difficulties. Using these two variables, group membership was predicted with 77% accuracy (10 out of 13 children) for the at-risk group and with 75% accuracy (55 out of 73 children) for the not at-risk group. Refer to Table 4, column 7.

Spring K. In these analyses, sentence repetition, $F(1, 84) = 21.28$, $p = .000$, blending, $F(2, 83) = 13.90$, $p = .000$, and expressive morphology, $F(3, 82) = 11.23$, $p = .000$, in English were unique and significant predictors of risk for English-L1 oral language difficulties at the end of Grade 1. Using these three variables, group membership was predicted with 77% accuracy (10 out of 13 children) for the at-risk group and with 84% accuracy (61 out of 73 children) for the not at-risk group. Arguably, blending emerged as a significant predictor of oral language difficulties using both the Fall- and Spring-K predictors because there were a number of children in the at-risk group who, in addition to being at risk for oral language difficulties, were at risk with respect to reading. This is consistent with our Fall-K and Spring-K PCA results indicating that blending is significantly correlated with reading tasks and least correlated with oral language predictors. Refer to Table 4, column 8.

Insert Table 4 about here

Discussion

In order to determine if there are distinct risk profiles associated with language and reading difficulties (and possibly clinical impairment) in L2 students, we first examined whether predictors of reading and oral language development in English as a first language constitute separate underlying components. PCA of the Fall-K and Spring-K data revealed that there were two latent components that accounted for a majority of the variance in our K predictor tests. Moreover, these two components could easily be conceptualized in terms of oral language and reading abilities. Together, these two components accounted for over 50% of the variance in the scores on the Fall- and Spring-K predictors.

Further evidence for the distinctiveness of oral language and reading abilities and, by inference, difficulties, emerged in our finding that children who performed greater than one standard deviation below the mean on the oral language outcome tests generally did not score more than one standard deviation below the mean on the tests of reading at the end of Grade 1. More specifically, 7% of the children in our sample (22% of the entire at-risk subgroup) scored more than one standard deviation below the mean on the oral language tests only, 10.5% of the children (33% of the at-risk subgroup) scored more than one standard deviation below the mean on pseudoword decoding only, and 8% of the children (26% of the at-risk subgroup) scored more than one standard deviation below the mean on both oral language and word decoding tests. In short, while the percentage of children who demonstrated difficulty in both domains is greater than chance (i.e., less than 5%, or children who are borderline or below normal either in terms of their reading or oral language abilities, but within normal limits in the other domain), there is not complete overlap. These results are consistent with those of Catts et al. (2005) who found that 8% of their entire sample met diagnostic criteria for dyslexia, 6% met criteria for PLI, and 15%

met criteria for both dyslexia and PLI, suggesting that PLI and dyslexia are distinct though potentially comorbid conditions. These results imply that professionals working with children who are at risk for oral or reading difficulties should not assume they have difficulty in both; rather, they should assume differentiated risk unless assessment indicates otherwise.

A primary aim of the study was to assess the validity and utility of L1 predictors of L2 reading and oral language difficulties. Discriminant analyses revealed that blending in English in Fall K and Spring K was a significant predictor of both word decoding and reading comprehension difficulty in French at the end of Grade 1. In addition to blending, rapid automatized naming in Fall K and letter-sound knowledge in Spring K were also significant predictors of reading comprehension at the end of Grade 1. The important contribution of letter-sound knowledge and PA (i.e., blending) is not surprising since the predictive role of these variables in learning to read is supported by an abundance of L1 and L2 reading research (e.g., Comeau et al., 1999; for reviews see also August & Shanahan, 2006; Genesee, Lindholm-Leary, Saunders, & Christian, 2006). Interestingly, in Fall K, rapid automatized naming of objects rather than letter-sound knowledge was a predictor of reading difficulty, in addition to blending. Arguably, letter-sound knowledge in Fall of K was not a significant predictor of reading difficulty in Grade 1 because the children had just begun to learn the sounds of letters of the French alphabet systematically at that time. As a result, this was a difficult task for them at the beginning, but not at the end, of K. That rapid automatized naming emerged as a significant predictor of reading in Grade 1 only when we included children at risk for oral language difficulties along with children who were at risk for reading difficulties in our analyses suggests that it is somehow linked to oral language. This is consistent with findings in our earlier study where rapid automatized naming was predictive of reading comprehension, a task that is closely dependant upon oral language, but was not predictive of decoding (Erdos et al., 2011).

That the predictors of pseudoword decoding and reading comprehension were the same might seem surprising since it is thought that reading comprehension entails a broader range of oral language skills than does decoding (e.g., Cain & Oakhill, 2006; for reviews see also August & Shanahan, 2006; Johnston, Barnes, & Desrochers, 2008). However, it should be recalled that all but one child in the present study met criteria for both decoding and reading comprehension difficulties and, thus, the reading comprehension difficulties of these children are probably directly linked to their word decoding difficulties. It may also be that comprehension at this grade level is largely dependent on word-by-word reading or that the comprehension test used at this level was too easy; thus, looking at older students using comprehension tasks that are more demanding is important. At the same time, it is interesting to note here that Jared et al. (2011) also found that PA in English assessed in K was a significant predictor of reading comprehension in French-L2 in Grade 3, suggesting that L2 readers may rely on word-by-word reading even when reading more complex texts in higher grades.

Taken together, these findings suggest that, although other research has found that performance on tests related to oral language are important for reading comprehension among students beyond the initial stages of learning to read (Kirby & Savage, 2008; Savage, 2006), performance on tests related to decoding are significant predictors of risk for reading comprehension difficulties early on. It follows then that an important starting point in identifying the underlying difficulties of children with L2 reading comprehension difficulties is decoding and, in particular, their PA skills. It may be, however, that the reading comprehension difficulties of struggling readers beyond Grade 1, when children have to read to learn rather than learn to read, are different. Furthermore, that virtually all the children in the present study who were experiencing difficulty with decoding were also experiencing difficulty with reading comprehension calls into question the existence of a third group of poor comprehenders whose decoding and oral language abilities are intact; in fact, there was only one child who met such criteria in our study.

Due to the small number of children at risk for oral language difficulties in L1 and the even smaller number of children with oral language difficulties in both L1 and L2, it was necessary to run our statistical analyses using a "mixed" group of children who performed more than one standard deviation below the mean on either oral language alone or both oral language and reading; risk in these cases was based on L1 performance (see Figure 1). In effect, we were in fact stacking the odds against finding distinct sets of predictors for reading and oral language difficulties. Despite this, we found predictors of oral language difficulty that differed from predictors of reading difficulty, namely sentence repetition and expressive grammar, in addition to PA, were the best predictors of end-of-Grade 1 oral language risk status. With a larger group of children at risk for oral language difficulties only, it would not be unlikely to find that only oral language scores (and not scores on literacy tasks) are predictors of risk for oral language difficulties.

Insert Figure 1 about here

In all our analyses, predictions made on the basis of Spring-K results were more accurate than predictions made on the basis of Fall-K results, but reasonable predictions were nonetheless made using the Fall-K results. These findings argue against a wait-and-see approach to identifying oral language and/or reading difficulty in L2 learners. Indeed, these predictors were able to predict risk for reading and/or language learning difficulties with 71% and upwards accuracy. Of particular importance, the present results provide evidence that, in early L2 immersion settings, assessments conducted in students' L1 can be used to identify, with reasonable accuracy, students who are at risk for reading and/or language difficulties and, thus, could benefit from additional support early on.

In conclusion, we have provided evidence that argues for distinct risk profiles for oral language and reading development in students learning through a second language, as has been argued for L1 children (see also, Catts et al., 2005, and de Bree & Kerkhoff, 2010), and have presented evidence that speaks to the feasibility of early identification of L2 children who are at risk for oral and/or written language difficulties on the basis of their performance on L1 measures administered in K.

Limitations

This study has limitations. Primarily, a causal link cannot be established between our predictor and outcome variables as a result of the correlational nature of the study. Nonetheless, the present results could be used as the foundation for an intervention study, whereby we would attempt to further validate our findings and possibly establish a causal link between the predictor and outcome variables. A second limitation is our small sample size, especially of the at-risk groups, and the obvious statistical constraints that resulted from this. However, as previously stated, we were interested in exploring models that could be applied to classroom settings where sample sizes are typically similarly small. A third limitation is that the distribution of our sample was non-normal in some respects, namely 10% of our sample fell below one standard deviation with respect to their performance on decoding tasks, 17% fell below one standard deviation with respect to their performance on reading comprehension tasks, 7% fell below one standard deviation with respect to their performance on oral language (L1, L1 & L2) tasks. Although not ideal, our slightly elevated number of at-risk students permitted us to more fully examine this population statistically. Most importantly, however, we are missing a control group of children instructed in L1 with whom we can cross-validate our findings. While we have been recruiting such a control group, recruitment is ongoing due to the fact that there is a much smaller proportion of children meeting our recruitment criteria (namely, being English dominant) who attend English-L1 programs in Quebec. Lastly, our results pertain specifically to a dual language learning situation where the two languages are of equal status and, thus may differ from what we would obtain if the L1 was a minority language. However, as stated earlier, there are reasons to believe that our findings would probably have at least some generalizability to contexts where the L1 is a minority language, as is the case for most immigrant children.

Practical Implications

Our results suggest using targeted screening tests in second language learners' first language for identification of risk for L2 reading and oral language difficulties and that these are both sensitive and specific even when administered as early as the beginning of K. Our results further suggest that it is not only appropriate but feasible to gear intervention strategies to the specific domain of difficulty rather than taking a more general approach, since a good proportion of children do not appear to have overlapping impairments.

References

Alloway, T. P., & Gathercole, S. E. (2005). Working memory and short-term sentence recall in young children. *European Journal of Cognitive Psychology, 17*(2), 207-220.

Anderson, R, & Lockowitz, A. (2009). How do children ascribe gender to nouns? A study of Spanish-speaking children with and without specific language impairment. *Clinical Linguistics & Phonetics*, *23*(7), 489-506.

Archibald, L.M.D., & Joanisse, M.F. (2009). On the sensitivity and specificity of nonword repetition and sentence recall to language and memory impairments in children. *Journal of Speech, Language, and Hearing Research*, *52*(4), 899-914.

August, D., & Shanahan, T. (Eds.). (2006*). Developing literacy in second- language learners: Report of the national literacy panel on language-minority children and youth.* Mahwah, NJ: Erlbaum.

Baddeley, A. D., Gathercole, S. E., & Papagno, C. (1998). The phonological loop as a language learning device. *Psychological Review, 105*(1), 158-173.

Bartlett, M.S. (1950). Tests of significance in factor analysis. *British Journal of Statistical Psychology, 3*(1), 77-85.

Bedore, L.M., & Pena, E.D. (2008). Assessment of bilingual children for identification of language impairment: Current findings and implications for practice. *International Journal of Bilingual Education and Bilingualism, 11*(1), 1-29.

Bishop, D.V.M., Adams, C.V., & Norbury, C.F. (2006). Distinct genetic influences on grammar and phonological short-term memory deficits: Evidence from 6-year-old twins. *Genes, Brain and Behavior, 5*(2), 158-169.

Bishop, D.V.M., & Snowling, M.J. (2004). Developmental dyslexia and specific language impairment: Same or different? *Psychological Bulletin*, *130*(6), 858-88.

Botting, N., & Conti-Ramsden, G. (2001). Non-word repetition and language development in children with language impairments. *International Journal of Language and Communication Disorders*, *36*(4), 421-432.

Botting, N., Faragher, B., Simkin, Z., Knox, E., & Conti-Ramsden G. (2001). Predicting pathways of specific language impairment: what differentiates good and poor outcome? *Journal of Child Psychology and Psychiatry and Allied Disciplines*, *42*(8), 1013-1020.

Botting, N., Simkin, Z., & Conti-Ramsden, G. (2006). Associated reading skills in children with a history of Specific Language Impairment (SLI) . *Reading and Writing*, *19*(1), 77-98.

Bournot-Trites, M., & Denizot, I. (2005, January). *Conscience phonologique en immersion française au Canada.* Paper presented at the 1er Colloque International de Didactique Cognitive, Toulouse, France.

Bowey, J. A. (2005). Predicting individual differences in learning to read. In M. J. Snowling, & C. Hulme (Eds.), *The science of reading: A handbook* (pp. 155-171). Malden, MA: Blackwell.

Buschmann, A., Jooss, B., Rupp, A., Feldhusen, F., Pietz, J., & Philippi, H. (2009). Parent based language intervention for 2-year-old children with specific expressive language delay: A randomised controlled trial. *Archives of Disease in Childhood*, *94*(2), 110-116.

Cain, K., & Oakhill, J. (1999). Inference ability and its relation to comprehension failure in young children. *Reading and Writing*, *11*(5-6), 489-503.

Cain, K., & Oakhill, J. (2006). Profiles of children with specific reading comprehension difficulties. *British Journal of Educational Psychology*, *76*(4), 683-696.

Cain, K., Oakhill, J., Barnes, M. A., & Bryant, P. E. (2001). Comprehension skill, inference making ability and their relation to knowledge. *Memory and Cognition*, *29*(6), 850-859.

Carlisle, J. F., Beeman, M. M., Davis, L. H., & Spharim, G. (1999). Relationship of metalinguistic capabilities and reading achievement for children who are becoming bilingual. *Applied Psycholinguistics, 20*(4), 459-478.

Catts, H., Adlof, S. M., & Ellis Weismer, S. E. (2006). Language deficits in poor comprehenders: A case for the simple view of reading. *Journal of Speech, Language, and Hearing Research*, *49*(2), 278-293.

Catts, H., Adlof, S., Hogan, T., & Ellis Weismer, S. (2005). Are specific language impairment and dyslexia distinct disorders? *Journal of Speech, Language, and Hearing Research*, *48*(6), 1378-1396.

Catts, H.W., Gillespie, M., Leonard, L. B., Kail, R. V., & Miller, C. A. (2002). The role of speed of processing, rapid naming, and phonological awareness in reading achievement. *Journal of Learning Disabilities*, *35*(6), 509-524.

Chiappe, P., Siegel, L.S., & Wade-Woolley, L. (2002). Linguistic diversity and the development of reading skills: A longitudinal study. *Scientific Study of Reading*, *6*(4), 369-400.

Comaskey, E. M., Savage, R. S., & Abrami, P. (2009). A randomised efficacy study of web-based synthetic and analytic programmes among disadvantaged urban kindergarten children. *Journal of Research in Reading*, *32*(1), 92-108.

Comeau, L., Cormier, P., Grandmaison, E., & Lacroix, D. (1999). A longitudinal study of phonological processing skills in children learning to read in a second language. *Journal of Educational Psychology*, *91*(1), 29-43.

Conti-Ramsden, G., Botting, N., & Faragher, B. (2001). Psycholinguistic markers for SLI. *Journal of Child Psychology and Psychiatry, 42*(6), 741-748.

Cormier, P., Desrochers, A., & Sénéchal, M. (2006). Validation et consistance interne d'une batterie de tests pour l'évaluation multidimensionnelle de la lecture en français. *Revue des sciences de l'éducation*, *32*(1), 205-225.

Corriveau, K., Pasquini, E., & Goswami, U. (2007). Basic auditory processing skills and Specific Language Impairment: A new look at an old hypothesis. *Journal of Speech, Language, and Hearing Research*, *50*(3), 647-666.

Dale, P., Price, T., Bishop, D., & Plomin, R. (2003). Outcomes of early language delay: I. Predicting persistent and transient language difficulties at 3 and 4 years. *Journal of Speech, Language, and Hearing Research, 46*(3), 544-560.

De Bree, E., & Kerkhoff, A. (2010). Bempen or bemben: Differences between children at-risk of dyslexia and children with SLI on a morpho-phonological task. *Scientific Studies of Reading*, *14*(1), 85-109.

Dockrell, J.E., Lindsay, G., & Palikara, O. (2011). Explaining the academic achievement at school leaving for pupils with a history of language impairment: Previous academic achievement and literacy skills. *Child Language Teaching and Therapy*, *27*(2), 223-237.

Dufva, M., & Voeten, M.J.M. (1999). Native language literacy and phonological memory as prerequisites for learning English as a foreign language. *Applied Psycholinguistics, 20*(3), 329-348.

Dunn, L. M., & Dunn, L. M. (1997). *Peabody Picture Vocabulary Test – 3rd Edition*. Circle Pines, MN: American Guidance Service.

Dunn, L. M., Thériault-Whalen, C. M., & Dunn, L. M. (1993). *Echelle de Vocabulaire en Images Peabody* [Peabody PictureVocabulary Test]. Toronto: Psycan.

Eagan, R., & Cashion, M. (1988). Second year report of a longitudinal study of spontaneous reading in English by students in early French immersion classrooms. *Canadian Modern Language Review*, *44*(3), 521-526.

Eisenmajer, N., Ross, N., & Pratt, C. (2005). Specificity and characteristics of learning disabilities. *Journal of Child Psychology and Psychiatry*, *46*(10), 1108-1115.

Elin Thordardottir, & Namazi, M. (2007). Specific language impairment in French-speaking children: Beyond grammatical morphology. *Journal of Speech, Language, and Hearing Research*, *50*(3), 698-715.

Ellis Weismer, S. (2007). Typical talkers, late talkers, and children with specific language impairment: A language endowment spectrum? In R. Paul (Ed.), *The influence of developmental perspectives on research and practice in communication disorders: A festschrift for Robin S. Chapman* (pp. 83-101). Mahwah, NJ: Lawrence Erlbaum Associates.

Erdos, C., Genesee, F., Savage, R., & Haigh, C. (2011). Individual differences in second language reading outcomes. *International Journal of Bilingualism*, *15*(1), 3-25.

Fraser J., Goswami U., & Conti-Ramsden, G. (2010). Dyslexia and specific language impairment: The role of phonology and auditory processing. *Scientific Studies of Reading*, *14*(1), 8-29.

Genesee, F., Lindholm-Leary, K., Saunders, W.M., & Christian, D. (Eds.). (2006). *Educating English language learners: A synthesis of research evidence.* New York: Cambridge University Press.

Geva, E., & Clifton, S. (1994). The development of first and second language reading skills in early French immersion. *The Canadian Modern Language Review*, *50*(4), 646-667.

Girolametto, L., Weitzman, E., & Clements Baartman, J. (1998). Vocabulary intervention for children with Down syndrome: Parent training using focused stimulation. *Infant Toddler Intervention*, *8*(2), 109-125.

Goffman, R., & Leonard, R. (2000). Growth of language skills in preschool children with specific language impairment: Implications for assessment and intervention. American *Journal of Speech-Language Pathology*, *9*(2), 151–161.

Goldstein, B., Harris, K., & Klein, M. (1993). Assessment of oral storytelling abilities of Latino junior high school students with learning handicaps. *Journal of Learning Disabilities, 26*(2), 38-143.

Graf Estes, K., Evans, J. L., & Else-Quest, N. M. (2007). Differences in the nonword repetition performance of children with and without specific language impairment: a meta-analysis. *Journal of Speech, Language, and Hearing Research*, *50*(1), 177-195.

Gutierrez-Clellen, V.F., & Simon-Cereijido, G. (2007). The discriminant accuracy of a grammatical measure with Latino English-speaking children. *Journal of Speech, Language, and Hearing Research*, *50*(4), 968-981.

Gutierrez-Clellen, V.F., & Simon-Cereijido, G. (2010). Using nonword repetition tasks for the identification of language impairment in Spanish-English-speaking children: Does the language of assessment matter? *Learning Disabilities Research & Practice*, *25*(1), 48-58.

International Dyslexia Association (2007). Retrieved May 12, 2010, from http://www.interdys.org

Jared, D., Cormier, P., Levy, B.A., & Wade-Woolley, L. (2006, June). *Becoming biliterate: A longitudinal investigation of reading growth in children in French immersion.* Paper presented at the conference of the Canadian Language and Literacy Research Network, Charlottetown, PEI.

Jared, D., Cormier, P., Levy, B. A., & Wade-Woolley, L. (2011). Early predictors of biliteracy development in children in French Immersion: A four-year longitudinal study. *Journal of Educational Psychology*, *103*(1), 119-139.

Jefferies, E., Patterson, K., Jones, R., Bateman, D., & Lambon Ralph, M.A. (2004). A category-specific advantage for numbers in verbal short-term memory: Evidence from semantic dementia. *Neuropsychologia*, *42*(5), 639-660.

Johnston, A.M., Barnes, M.A., & Desrochers, A. (2008). Reading comprehension: Developmental processes, individual differences, and interventions. *Canadian Psychology/Psychologie canadienne*, *49*(2), 125-132.

Kaiser, H. F. (1960). The application of electronic computers to factor analysis. *Educational and Psychological Measurement*, *20*(1), 141-151.

Kaiser, H.F. (1970). A second generation little jiffy. *Psychometrika, 35*(4), 401-415.

Kamhi, A. G., & Catts, H. W. (1986). Toward an understanding of developmental language and reading disorders. *Journal of Speech and Hearing Disorders*, *51*(4), 337-347.

Kelso, K., Fletcher, J., & Lee, P. (2007). Reading comprehension in children with specific language impairment: An examination of two subgroups. *International Journal of Language & Communication Disorders*, *42*(1), 39-57.

Kirby, J. R., & Savage, R. S. (2008). Can the Simple View deal with the complexities of reading? *Literacy*, *42*(2), 75-82.

Law, J., Boyle, J., Harris, F., Harkness, A., & Nye, C. (2000). Prevalence and natural history of primary speech and language delay: Findings from a systematic review of the literature. *International Journal of Language & Communication Disorders*, *35*(2), 165-188.

Leonard, L. B. (1998). *Children with specific language impairment*. Cambridge, MA: MIT Press.

Lonigan, C.J., Burgess, S.R., & Anthony, J.L. (2000). Development of emergent literacy and early reading skills in preschool children: Evidence from a latent variable longitudinal study. *Developmental Psychology, 36*(5), 596-613.

Lyon, G.R., Shaywitz, S.E., & Shaywitz, B.A. (2003). Defining dyslexia, comorbidity, teachers's knowledge of language and reading: A definition of dyslexia. *Annals of Dyslexia*, *3*(1), 1-14.

MacCoubrey, S. J., Wade-Woolley, L., Klinger, D., & Kirby, J. (2004). Early identification of at-risk L2 readers. *The Canadian Modern Language Review*, *61*(1), 11-28.

Marshall, C. R., & Messaoud-Galusi, S. (2010). Developmental disorders of language and literacy: Special issue. *British Journal of Developmental Psychology*, *28*(1), 1-4.

Mathes, P., Pollard-Durodola, S. D., Cardenas-Hagan, E., Linan-Thompson, S., & Vaughn, S. (2007). Teaching struggling readers who are native Spanish speakers: What do we know? *Language, Speech, and Hearing Services in Schools*, *38*(3), 260-271.

McArthur, G. M., Hogben, J. H., Edwards, V. T., Heath, S. M., & Mengler, E. D. (2000). On the 'specifics' of specific reading disability and specific language impairment. *Journal of Child Psychology and Psychiatry*, *41*(7), 869–874.

Nation, K., & Snowling, M.J. (1998). Semantic processing and the development of word recognition skills: Evidence from children with reading comprehension difficulties. *Journal of Memory & Language*, *39*(1), 85-101.

National Institute for Literacy. (2008). *Developing early literacy: Report of the National Early Literacy Panel.* Washington, DC: National Institute for Literacy.

National Institute of Child Health & Human Development (2000). *Report of the National Reading Panel. Teaching children to read: An evidence-based assessment of the scientific research literature on reading and its implications for reading instruction.* Washington, DC: U.S. Department of Health and Human Services.

Oakhill, J., Cain, K., & Bryant, P. E. (2003). The dissociation of word reading and text comprehension: Evidence from component skills. *Language and Cognitive Processes*, *18*(4), 443-468.

Paradis, J. (2008). Tense as a clinical marker in English L2 acquisition with language delay/impairment. In E. Gavruseva & B. Haznedar (Eds.), *Current Trends in Child Second Language Acquisition: A Generative Perspective* (pp. 337-356). Amsterdam: John Benjamins.

Paradis, J. (2010). The interface between bilingual development and specific language impairment. Keynote article for special issue with peer commentaries. *Applied Psycholinguistics*, *31*(2), 3-28.

Paradis, J., & Crago, M. (2001). The morphosyntax of specific language impairment in French: evidence for an extended optional default account. *Language Acquisition, 9*(4), 269-300.

Paradis, J., Crago, M., Genesee, F., & Rice, M. (2003). Bilingual children with specific language impairment: How do they compare with their monolingual peers? *Journal of Speech, Language, and Hearing Research*, *46*(1), 113-127.

Paradis, J., Genesee, F., & Crago, M. (2010). *Dual Language Development and Disorders: A Handbook on Bilingualism and Second Language Learning* (2nd ed.). Baltimore: Paul H. Brookes.

Pennington, B. F. & Bishop, D. V. M. (2009). Relations among speech, language and reading disorders. Annual Review of Psychology, 60, 283-306.

Peregoy, S. (1989). Relationships between second language proficiency and reading comprehension of bilingual fifth grade students. *NABE: The Journal of the National Association for Bilingual Education*, *13*(3), 217-234.

Peregoy, S., & Boyle, O. (1991). Second language oral proficiency characteristics of low, intermediate and high second language readers. *Hispanic Journal of Behavioral Sciences, 13*(1), 35-47.

Purvis, K. L., & Tannock, R. (2000). Phonological processing, not inhibitory control, differentiates ADHD and reading disability. *Journal of the American Academy of Child and Adolescent Psychiatry*, *39*(4), 485-494.

Raven, J., Raven, J.C., & Court, J.H. (1998). *Coloured Progressive Matrices-1998 Edition.* Oxford, England: Oxford Psychologists Press.

Reese, L., Garnier, H., Gallimore, R., & Goldenberg, C. (2000). Longitudinal analysis of the antecedents of emergent Spanish literacy and middle-school English reading achievement of Spanish-speaking students. *American Educational Research Journal*, *37*(3), 633–662.

Restrepo, M.A., & Gutierrez-Clellen, V.F. (2001) Article Use in Spanish- speaking children with SLI. *Journal of Child Language*, *28*(2), 433-452.

Rice, M. L. (1999). Specific grammatical limitations in children with specific language impairments. In H. Tager-Flusberg (Ed.), *Neurodevelopmental Disorders* (pp. 331-359). Cambridge: MIT Press.

Rice, M.L. (2007). Children with Specific Language Impairment: Bridging the Genetic and Developmental Perspectives. In E. Hoff and M. Shatz (Eds.), *Handbook of Language Development* (pp. 411-431). Cambridge, MA: Blackwell Publishers.

Rice, M., Taylor, C., & Zubrick, S. (2008). Language outcomes of 7-year-old children with or without a history of late language emergence at 24 months. *Journal of Speech, Language, and Hearing Research, 51*(2), 394-407.

Rice, M., & Wexler, K. (1996). Toward tense as a clinical marker for specific language impairment in English-speaking children. *Journal of Speech and Hearing Research*, *39*(6), 1239-1257.

Rice, M., & Wexler, K. (2001). *Test of Early Grammatical Impairment*. New York: The Psychological Corporation.

Riches, C., & Genesee, F. (2006). Cross-linguistic and cross-modal aspects of literacy development. In F. Genesee, K. Lindholm-Leary, W. Saunders, & D. Christian, D. (Eds.), *Educating English language learners: A synthesis of research evidence* (pp. 64-108). NY: Cambridge University Press.

Rispens, J., & Been, P. (2007). Subject-verb agreement and phonological processing in developmental dyslexia and specific language impairment (SLI): a closer look. *International Journal of Language and Communication Disorders*, *42*(3), 293-305.

Rothweiler, M., Chilla, S., & Babur, E. (2010). Specific language impairment in Turkish: Evidence from case morphology in Turkish-German successive bilinguals. *Clinical Linguistics & Phonetics, 24*(7), 540-555.

Royer, J.M. & Carlo, M.S. (1991). Transfer of comprehension skills from native to second language. *Journal of Reading, 34*(6), 450-455.

Savage, R. S. (2006). Reading comprehension is not always the product of decoding and listening comprehension: Evidence from teenagers who are very poor readers. *Scientific Studies of Reading*, *10*(2), 143-164.

Savage, R. S., & Frederickson, N. (2005). Evidence of a highly specific relationship between rapid automatic naming of digits and text-reading speed. *Brain and Language*, *93*(2), 152-159.

Scanlon, D.M., Anderson, K.L., & Flynn, L.H. (2008, November). *Preventing reading difficulties: The role of instruction and experience before first grade.* Presentation for the Early Childhood Direction Center, Capital Region Board of Cooperative Educational Services, Latham, NY.

Scarborough, H. S. (1990). Very early language deficits in dyslexic children. *Child Development*, *61*(6), 1728-1734.

Scarborough, H. S. (1991). Early syntactic development of dyslexic children. *Annals of Dyslexia*, *41*(1), 207-220.

Schatschneider, C., Fletcher, J. M., Francis, D. J., Carlson, C. D., & Foorman, B. R. (2004). Kindergarten prediction of reading skills: A longitudinal comparative analysis. *Journal of Educational Psychology*, *96*(2), 265-282.

Semel, E., Wiig, E.H., & Secord, W.A. (2003). *Clinical Evaluation of Language Fundamentals-4th Edition*. USA: The Psychological Corporation.

Share, D.L., Silva, P.A., & Adler C.J. (1987). Factors associated with reading-plus-spelling retardation and specific spelling retardation. *Developmental Medicine and Child Neurology*, *29*(1), 72-84.

Shaywitz, S. (2003). *Overcoming dyslexia: A new and complete science-based program for reading problems at any level.* New York: Alfred A. Knopf.

Shaywitz, S.E., & Shaywitz, B.A. (2005). Dyslexia (specific reading disability). *Biological Psychiatry*, *57*(11), 1301-1309.

Shaywitz, S.E., Shaywitz, B.A., Fletcher, J.M., & Estabar, M.D. (1990). Prevalence of reading disability in boys and girls. *The Journal of the American Medical Association*, *264*(8), 998-1002.

Silva, P., McGee, R., & Williams, S. (1983). A follow-up study of the prevalence and stability of developmental language delay from three to seven years of age and its significance for seven year low intelligence and reading difficulties. *Developmental Medicine and Child Neurology*, *25*(6), 783-793.

Silva, P.A., McGee, R., & Williams, S., (1985). Some characteristics of 9-year-old boys with general reading backwardness of specific reading retardation. *Journal of Child Psychology and Psychiatry 26*(3), 407-421.

Simon-Cereijido, G., & Gutierrez-Clellen, V.F. (2007). Spontaneous language markers of Spanish language impairment. *Applied Psycholinguistics, 28*(2), 317-339.

Statistics Canada (2006). Census of Population, Statistics Canada catalogue no. 97-555-XCB2006015. Retrieved June 11, 2008, from http://www12.statcan.gc.ca/census-recensement/2006

Stevens, J.P. (2002). *Applied Multivariate Statistics for the Social Sciences*. Mahwah, NJ: Lawrence Erlbaum Associates.

Stokes, S. F., & Fletcher, P. (2003). Aspectual forms in Cantonese-speaking children with specific language impairment. *Linguistics, 41*(2), 381-406.

Storch, S. A., & Whitehurst, G. J. (2002). Oral language and code-related precursors to reading: Evidence from a longitudinal structural model. *Developmental Psychology*, *38*(6), 934-947.

Thal, D. (2005a, April). *Early detection of risk for language impairment: What are the best strategies?* Paper presented at the Congress on Language and Speech Disorders, Urbino, Italy.

Thal, D. (2005b, November). *Early detection of risk for language impairment: What are the best strategies?* Paper presented at the annual convention of the American Speech, Language, and Hearing Association, San Diego, CA.

Tomblin, J. B., Records, N. L., Buckwalter, P., Zhang, X., Smith, E., & O'Brien M. (1997). Prevalence of specific language impairment in kindergarten children. *Journal of Speech, Language, and Hearing Research*, *40*(6), 1245-1260.

Tomblin, J. B., Zhang, X., Weiss, A., Catts, H., & Ellis-Weismer, S. (2004). Dimensions of individual differences in communication skills among primary grade children. In M. L. Rice & S. F. Warren (Eds.), *Developmental language disorders: From phenotypes to etiologies* (pp. 53-76). Mahwah, NJ: Erlbaum.

Vandewalle, E., Boets, B., Ghesquière, P., & Zink, I. (2010). Who is at risk for dyslexia? Phonological processing in five- to seven-year-old Dutch-speaking children with SLI. *Scientific Studies of Reading*, *14*(1), 58-84.

Vaughn, S., Fletcher, J. M., Francis. D. J., Denton, C. A., Wanzek, J., Wexler, J., et al. (2008). Response to intervention with older students with reading difficulties. *Learning and Individual Differences, 18*(3), 338-345.

Verhoeven, L.T. (1990). Acquisition of reading in a second language. *Reading Research Quarterly, 25*(2), 90-114.

Verhoeven, L. (2007). Early bilingualism, language transfer, and phonological awareness. *Applied Psycholinguistics, 28*(3), 425-439.

Waltzman, D. E., & Cairns, H. S. (2000). Grammatical knowledge of third grade good and poor readers. *Applied Psycholinguistics*, *21*(2), 263-284.

Wechsler, D. (2005). *Wechsler Individual Achievement Test – 2nd Edition*, Canadian. Toronto, Ontario: Pearson Canada Assessment Inc.

Wilkinson, G.S. (1993). *Wide Range Achievement Test-3rd Edition*. Wilmington, DE: Wide Range, Inc.

Windsor, J., & Kohnert, K. (2009). Processing speed, attention, and perception: Implications for child language disorders. In R. G. Schwartz (Ed.), *The handbook of child language disorders* (pp.445-461). New York: Psychology Press.

Wolf, M., & Denckla, M.B. (2005). *Rapid Automatized Naming and Rapid Alternating Stimulus Tests*. Austin, TX: Pro-Ed.

Wong, A.-M.-Y**.,** Kidd, J., Ho. C. S.-H., & Au, T, K.-F. (2010). Characterizing the overlap between SLI and dyslexia in Chinese: The role of phonology and beyond. *Scientific Studies of Reading*, *14*(1), 30-57.

Table 1

Tests Administered at Each Time Point.

Testing Period :	Fall K	Spring K	Spring Grade 1
CONTROL TESTS :			
Hearing	X		
Vision	X		
Cognitive Ability	X		
PREDICTOR TESTS :			
Risk for Language Difficulty			
English PPVT-III	X		
French EVIP	X		
English CELF-4 Recalling Sentences	X	X	
English TEGI 3rd Person Present Tense	X	X	
English TEGI Past Tense	X	X	
Risk for Reading Difficulty			
English Blending	X	X	
English RAN	X	X	
English Letter-sound Knowledge	X		
French Letter-sound Knowledge		X	
English WRAT-3 Letter-name Knowledge	X	X	
French WRAT-3 Letter-name Knowledge	X	X	
English WRAT-3 Word Decoding	X	X	
OUTCOME TESTS			
Language Outcomes			
English CELF-4 Concepts and Following Directions			X
French CELF-4 Concepts and Following Directions			X
English CELF-4 Sentence Structure			X
French CELF-4 Sentence Structure			X
Reading Outcomes			
French WIAT-II Pseudoword Decoding			X
French BEMEL Reading Comprehension			X

Table 2

Means and Standard Deviations for All Variables Included in the Analyses.

	Fall K					Spring K					Spring Grade 1				
	N	Min.	Max.	M	SD	N	Min.	Max.	M	SD	N	Min.	Max.	M	SD
Age	86	59.00	73.00	66.83	3.59										
Nvb IQ	86	11.00	36.00	18.30	4.42										
Rec Voc (E)	86	46.00	115.00	80.60	15.43										
Rec Voc (F)	86	1.00	94.00	28.94	18.94										
Bldg VC (E)	86	0.00	9.00	3.24	3.45	86	0.00	9.00	4.98	3.71					
Bldg cat (E)	86	1.00	2.00	1.59	0.49	86	1.00	2.00	1.74	0.44					
L-S (E)	86	0.00	22.00	7.43	6.70										
L-S (F)						86	1.00	23.00	14.92	5.67					
Exp Morph (E)	86	5.50	100.00	83.39	18.76	86	4.50	100.00	88.27	14.87					
CFD (E)	86	5.00	41.00	23.19	9.26	86	6.00	46.00	28.30	9.37	86	16.00	51.00	36.69	8.18
RS (E)	86	0.00	64.00	34.52	12.42	86	7.00	66.00	39.14	12.99	86	15.00	79.00	45.43	13.98
SS (E)											86	18.00	26.00	2.20	1.87
CFD (F)											86	11.00	47.00	33.35	8.69
RS (F)											86	2.00	41.00	16.15	9.00
SS (F)											86	10.00	26.00	20.63	3.44
Ltr names (E)	86	0.00	15.00	10.44	4.43	86	3.00	15.00	12.08	3.65					
Wd dec (E)	86	0.00	16.00	0.53	1.94	86	0.00	15.00	1.73	3.44					
RAN-o (E)	85	38.00	120.00	70.62	17.38	86	40.00	124.00	68.05	15.95					
Mo Ed (years)	79	5.00	13.00	8.58	2.44										
Fa Ed (years)	76	4.00	13.00	8.48	2.79										
Wd Comp (F)											86	6.00	30.00	19.98	6.07
Sent Comp (F)											86	4.00	28.00	21.47	6.24
Pswd (F)											86	0.00	53.00	17.93	13.58

Note. Nvb IQ = nonverbal IQ; (E) = English; (F) = French; Rec Voc = receptive vocabulary; Bldg CV, VC, CVC = blending CV, VC, CVC; Bldg cat = blending categorical variable; L-S = letter-sound knowledge; Exp Morph = expressive morphology; CFD = concepts and following directions; RS = recalling sentences; Ltr names = letter-name knowledge; Wd dec = word decoding; RAN-o = rapid automatized naming of objects; Mo/Fa Ed = mother/father education; Wd Comp = word comprehension; Sent Comp= sentence comprehension, Pswd: pseudoword decoding, K: kindergarten, Min.: minimum, Max.: maximum, Std. Dev.: standard deviation. Values represent raw scores.

Table 3

Factor Loadings from Principal Components Analyses of Fall and Spring Kindergarten Predictor Scores

	Fall K		Spring K	
	Lit	Lang	Lit	Lang
Bldg VC	0.75	0.09	0.70	0.12
Ltr names	0.72	0.33	0.71	0.07
Wd dec	0.61	0.08	0.61	0.06
RAN-o	-0.17	-0.71	-0.52	-0.31
RS	0.43	0.63	0.26	0.79
Exp Morph	0.20	0.76	0.13	0.82
L-S	0.81	0.34	0.86	0.19
Rec Voc	0.09	0.78	0.06	0.83
Variance	29.00%	29.00%	30.00%	27.00%

Note. Rec Voc = receptive vocabulary; Bldg VC = blending VC; L-S = letter-sound knowledge; Exp Morph = expressive morphology; RS = recalling sentences; Ltr names = letter-name knowledge; Wd dec = word decoding; RAN-o = rapid automatized naming of objects. Values represent factor loadings. Values underlined are significant.

Table 4

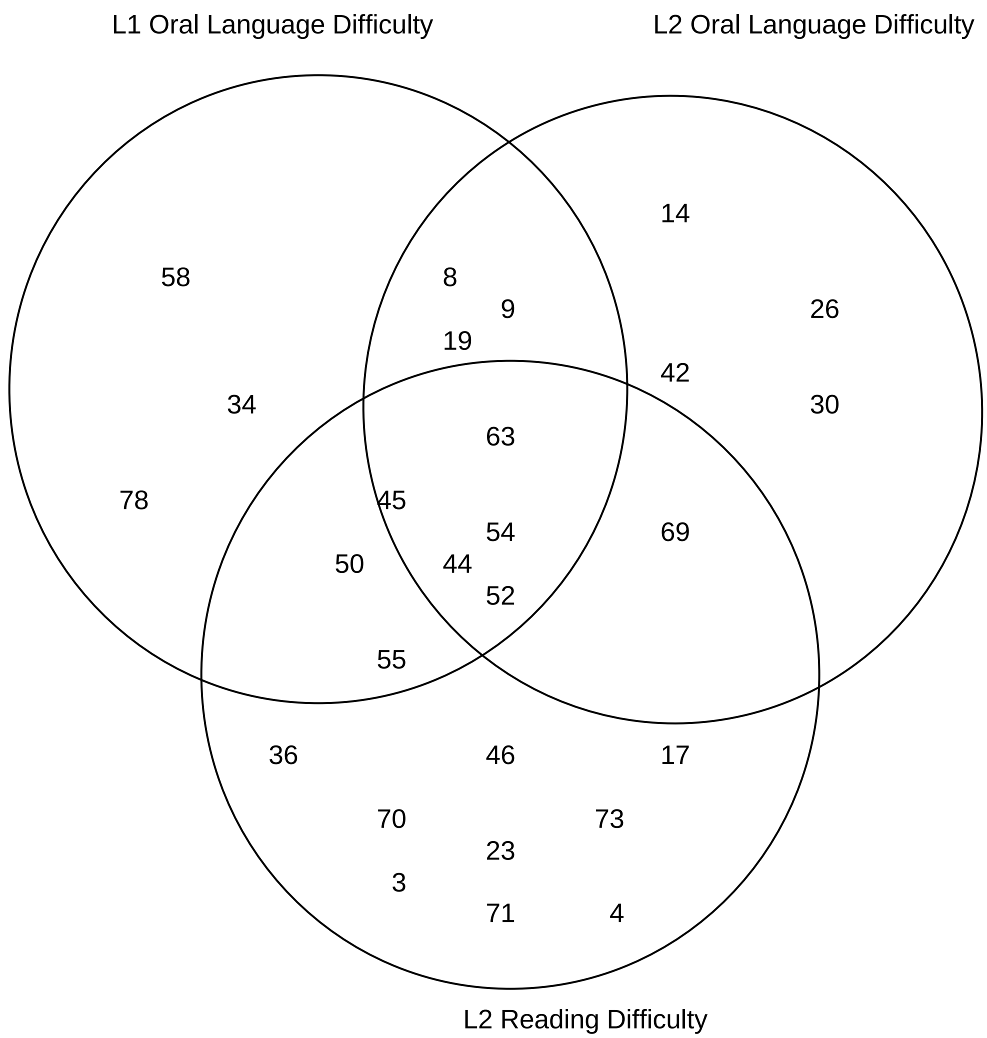
F Values from the Discriminant Analyses of the Predictions of French Grade 1 Outcomes using English K Predictors.

Outcome measures	Grade 1 Pswd				Grade 1 Rd Comp		Grade 1 Oral Lang	
	Fall K	Fall K	Spr K	Spr K	Fall K	Spr K	Fall K	Spr K
Predictor measures	n = 9	n = 17	n = 9	n = 17	n = 15	n = 15	n = 13	n = 13
Bldg VC	4.65	23.14	16.87	86.74	24.73	87.22	12.62	13.9
RAN-o	0.11	17.33	2.38	0.07	18.52	0.96	0.19	0.47
Ltr names	0.27	0.97	0	0	3.55	0.06	0.18	0.48
Wd dec	0.04	0.21	0.03	0.28	0.2	0.65	0.29	0.07
RS	0.03	0.43	0.04	3.4	0.18	0.98	18.67	21.28
Exp Morph	3.14	1.38	0.9	0.28	1.44	0.21	3.69	11.23
L-S	0.01	0	1.84	52.03	0.03	64.4	0.14	0.44
Rec voc	0.03	1.16	0.21	1.03	1.34	2.14	0.34	3.62
Predicted group membership								
At-risk	78%	74%	78%	88%	93%	93%	77%	77%
Typ Dev	64%	71%	81%	90%	75%	87%	75%	84%

Note. Rec Voc = receptive vocabulary; Bldg VC = blending VC; L-S = letter-sound knowledge; Exp Morph = expressive morphology; RS = recalling sentences; Ltr names = letter-name knowledge; Wd dec = word decoding; RAN-o = rapid automatized naming of objects; Typ dev = typically developing; Gr 1 = grade 1; K = kindergarten; Spr = spring; Rd = reading; Comp = comprehension; Pswd = Pseudoword; Dec = decoding; Lang = language. *F* values reported. Values underlined are significant.

Figure Caption

Figure 1. Venn diagram of case numbers with English-L1 oral language difficulty (upper left circle), French-L2 oral language difficulty (upper right circle), reading difficulty (bottom center circle), or both oral language and reading difficulty in Grade 1 (intersection area that includes bottom centre circle).


L1 Oral Language Difficulty
L2 Oral Language Difficulty
14
58
8
9
26
19
42
34
30
63
78
45
54
69
50
44
52
55
36
46
17
70
73
23
3
71
4
L2 Reading Difficulty