Predicting language and literacy outcomes of typically-developing and at-risk English-speaking elementary students in French Immersion programs

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Abstract

Many children around the world are educated in a second language, be they speakers of the majority language of the community in which they are educated or speakers of a minority language. Research has demonstrated the effectiveness of second language immersion for typically-developing students and students who are disadvantaged in the academic environment of schooling due to low levels of academic ability, disadvantaged socio-economic background, or minority ethnic group status (for a review see Genesee, 2006). In contrast, although it is generally thought that the level and kind of first language (L1) ability that children acquire prior to coming to school, and especially in domains related to literacy, are important predictors of success in school, there is little research on individual differences in second language (L2) reading and oral language development of immersion students and, in particular, on students who might be at risk for reading or oral language difficulties (Genesee, 2006).

We studied 86 English-dominant children in early French Immersion (FI) programs from Fall of Kindergarten (K) to Spring of Grade 1 and tested them at three time points: Fall K, Spring K, Spring Grade 1. Our sample included both typically-developing and at-risk children and our test battery included a broad range of oral language and literacy related predictor and control measures. Consistent with extensive L1 research (e.g., NICHD, 2000), the best K predictors of L2 decoding in Study 1 were knowledge of the alphabetic principle in English and phonological awareness in English. Contrary to what others have found (Jared, Cormier, Levy, & Wade-Woolley, 2006), knowledge of French at K entry

was a third significant predictor. The same variables were significant predictors of French reading comprehension, with the added contribution of scores related to oral language skills in L1, suggesting that oral language abilities play an important role in reading comprehension. Furthermore, we were able to test a popular theory of reading, the Simple View of Reading (Gough & Tunmer, 1986), and provided support for its intra- but not cross-linguistic applicability.

Study 2 involved an investigation of both oral language and literacy outcomes of children who were either typically developing or at risk for difficulties in the area of oral language or literacy. This study provides three-pronged evidence for the distinctiveness of oral language impairment and reading impairment, namely that 1) performance on oral language predictor measures was largely independent of performance on literacy predictor measures, suggesting that each domain constitutes a distinct underlying construct; 2) the most significant predictors of oral language and of literacy difficulties were different -- that is, phonological awareness (PA), phonological recoding, and letter-sound knowledge in L1 in K 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; and 3) three distinct subgroups were found in our sample and included children with oral language difficulties, children with literacy difficulties, and children presenting with difficulties in both domains. Even though we began administering predictor measures to the children at a point when they had not yet received literacy instruction, English L1 measures taken at the earliest time point (Fall K) and at the end of that academic year (Spring K) both predicted Grade 1 outcomes to a significant extent, although the latter predictors were more accurate.

Overall, our results suggest that risk for oral language and reading development are distinct; and it is possible to identify, early on, children who are likely to struggle in the domains of oral language or literacy, even if they are schooled in an L2. Our findings further suggest that it is possible to predict the specific domain that is likely to be difficult for them.

Résumé

De nombreux enfants à travers le monde sont scolarisés dans une langue seconde. Pour certains d'entre eux, leur première langue est la langue parlée majoritairement par la communauté dans laquelle ils vivent alors que pour d'autres, leur première langue est une langue minoritaire. Des études ont démontré l'efficacité des programmes d'immersion dans une langue seconde, tant pour les élèves qui se développent normalement que pour ceux qui sont désavantagés au plan académique soit à cause d'un rendement académique faible, soit en raison de l'appartenance à un milieu socio-économique défavorisé ou encore à un groupe ethnique minoritaire (voir Genesee, 2006, pour un résumé). Par contre, bien qu'il y ait une tendance à croire que la nature de la première langue (L1) ainsi que le niveau de développement dans cette langue avant l'entrée à l'école soient un prédicteur important du rendement académique surtout dans le domaine de la littératie, il y a peu d'études au sujet des différences individuelles notées au plan de la littératie et du langage oral dans une deuxième langue (L2) chez les élèves en immersion et surtout chez les élèves qui sont à risque de présenter des difficultés au plan de la littératie ou du langage oral (Genesee, 2006).

Quatre-vingt-six (86) élèves scolarisés dans un programme d'immersion française (IF) précoce et ayant l'anglais comme langue dominante ont été évalués à trois moments distincts, soit à l'automne de la maternelle, au printemps de la maternelle et au printemps de la première année. Notre échantillon comprenait des enfants qui se développaient normalement ainsi que des enfants à risque de

présenter des difficultés au plan du langage écrit ou du langage oral. Notre batterie de tests était formée d'un grand éventail d'épreuves de langage oral et de langage écrit. En accord avec la vaste littérature existant déjà au sujet de L1 (e.g. NICHD, 2000), les résultats de notre première étude ont démontré que les meilleurs prédicteurs à la maternelle pour le décodage en L2 étaient la connaissance du principe alphabétique en anglais et la conscience phonologique en anglais. Contrairement à ce que d'autres chercheurs ont trouvé (Jared, Cormier, Levy, & Wade-Woolley, 2006), la connaissance du français lors de l'entrée à la maternelle est apparue comme un troisième prédicteur significatif. Les mêmes variables ont été des prédicteurs significatifs de la compréhension en lecture, avec la contribution additionnelle des scores reliés au langage oral en L1, ce qui suggérait que les habiletés de langage oral jouent un rôle important en ce qui a trait à la compréhension en lecture. De plus, nous avons pu évaluer une théorie populaire qui porte sur la lecture, la théorie 'Simple View of Reading' (Gough & Tunmer, 1986). Nos résultats indiquaient que cette théorie était applicable de façon intralinguistique, mais pas de façon interlinguistique.

Dans une deuxième étude, nous avons examiné le développement du langage oral et de la littératie chez des élèves se développant normalement ou à risque de présenter des difficultés au plan du langage oral ou du langage écrit. Cette étude a mis en évidence le caractère distinct des déficits notés soit au plan du langage oral, soit au plan du langage écrit, et ce, à trois niveaux. Premièrement, la performance des élèves pour les prédicteurs du langage oral était indépendante de leur performance pour les prédicteurs de la littératie, ce qui suggérait que chaque domaine représentait un concept sous-jacent distinct. Deuxièmement, les prédicteurs les plus significatifs de difficultés au plan du langage oral et du langage écrit différaient les uns des autres – c'est à dire que la conscience phonologique, l'accès phonologique et la connaissance du son des lettres en L1 à la maternelle étaient des prédicteurs significatifs du risque de présenter des difficultés au plan du langage écrit en L2, tandis que la répétition de phrases, la conscience phonologique et l'habileté à marquer les temps de verbes en L1 à la maternelle étaient les meilleurs prédicteurs du risque de présenter des difficultés au plan du langage oral en L1 et en L2. Troisièmement, trois sous-groupes distincts ont été trouvés dans notre échantillon : celui des enfants présentant des difficultés au plan du langage oral, celui des enfants présentant des difficultés au plan du langage écrit et celui des enfants présentant des difficultés dans les deux domaines. Même si les épreuves ont été administrées à un moment où les élèves n'avaient pas encore reçu d'enseignement en langage écrit, leur performance en anglais, langue maternelle, au début de la maternelle ainsi que celle observée à la fin de la maternelle étaient toutes les deux un prédicteur significatif de leur performance en première année. Toutefois, la performance à la fin de la maternelle est apparue comme un prédicteur plus précis.

Globalement, nos résultats suggèrent l'existence de profils de risque distincts pour les difficultés au plan du langage écrit et pour celles notées au plan du langage oral. Ces résultats indiquent également qu'il est possible d'identifier très tôt les enfants qui ont de fortes chances d'avoir des difficultés de langage oral ou de langage écrit, et ce, même s'ils sont scolarisés dans une L2. Finalement, nos résultats suggèrent qu'il est possible de prédire le domaine spécifique qui pourrait être une source de difficulté pour ces enfants.

Contributions of Authors

The two studies included in this thesis were written as manuscripts co-authored by Fred Genesee, Robert Savage, Corinne Haigh, and me. The questions, rationale, and methodologies for each study were developed by me in collaboration with Dr. Genesee and Dr. Savage. The recruitment of participants was conducted by Dr. Genesee and me. I participated in the data collection, conducted the analyses, and drafted and revised the manuscripts. Dr. Genesee, Dr. Savage, and Dr. Haigh assisted in the interpretation of the data and provided feedback on the manuscripts.

I supervised graduate and undergraduate students over the course of my doctoral studies. They were involved in the studies as research assistants who tested participants and transcribed, coded, and entered the data. They are acknowledged in the Acknowledgements section below.

Study 1 is in press in the *International Journal of Bilingualism* and Study 2 has been submitted for publication to *Applied Psycholinguistics*. Over the past 5 years, I presented the results of these studies at various conferences.

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General Introduction

The studies that comprise this dissertation were designed to investigate individual differences in second language literacy and oral language development in English-speaking students educated in French Immersion (FI) programs. While much research has been conducted on the outcomes (linguistic, academic, and attitudinal) of FI students (Christian & Genesee, 2001; Genesee, 1987; 1984; Johnson & Swain, 1997; Lambert & Tucker, 1972; Swain & Lapkin, 1982), there is relatively little on individual differences in learner outcomes and, in particular, on students who are at risk for low levels of oral language and literacy development in their second language (L2).

As of the first day of school, learning is dependant upon one's ability to understand oral language and, beyond the early primary grades, reading is essential for learning academic subject matter and skills. Students who have difficulty understanding oral language or learning to read are, therefore, at serious risk of academic failure and of dropping out of school. There is a serious need to understand individual differences in at-risk learners in immersion programs specifically because there is a high rate of attrition from these otherwise very successful bilingual programs that has largely been attributed to oral language and reading difficulties in the L2 (e.g., Halsall, 1994; Hogan & Harris, 2005; Obadia & Thériault, 1997; Parkin, Morrison, & Watkin, 1987).

Beyond understanding individual differences, it is imperative that we understand what distinguishes oral language from reading difficulty because clinically, in many parts of the world, the health and education system is set up so that diagnoses of Primary Language Impairment (PLI) and dyslexia give rise to, or result in denial of, very different types of services. In Quebec, Canada, for example, a school-aged child with PLI would be eligible for enrolment in a rehabilitation centre where speech-language intervention is offered on a weekly basis or, if the degree of impairment is severe, in a “language class” where intensive speech-language intervention is provided. A child diagnosed with dyslexia, in contrast, would be denied rehabilitation services and would not be guaranteed specialized intervention of any form in school. Beyond the issue of access to services, clinicians are in need of guidance with respect to best practices in interventions for these children; for example, whether phonological awareness (PA) training should be offered to children who present with PLI only as well as to children with dyslexia. Furthermore, recognizing individual differences related to difficulties in these two areas early on and providing the corresponding targeted intervention is more likely to maximize intervention gains and possibly prevent a child from slipping below normal limits (e.g., Wallach, 2007; Scanlon, Anderson, & Flynn, 2008; Scanlon, Gelzheiser, Vellutino, Schnatschneider, & Sweeney, 2008). A better understanding of the factors that underlie PLI and dyslexia in students learning an L2 could also inform classroom instruction to better meet the needs of students who require additional attention in L2 oral and/or reading development.

The specific theoretical and empirical background to each study is presented later. In this general introduction, general theoretical and empirical findings and considerations that underpin these studies are reviewed and examined. There are, in fact, a number of different bodies of theory and research that underpin this research. This includes work on both students learning through the first language (L1) as well as work on students learning through an L2. The focus in each section will be on students with or at risk for impairment; in the case of reading, research on reading development in typical students as well as students with impairment will be considered since this is germane to Study 1 of the dissertation. Before proceeding with these reviews, there will be a review of studies that have evaluated the general language and literacy outcomes of students who have participated in immersion programs in Canada.

There have been extensive evaluations of the language, including oral and written language, outcomes and academic achievement of students in second language immersion programs in Quebec (Genesee, 1987; 1984; Lambert & Tucker, 1972) and elsewhere (e.g., Christian & Genesee, 2001; Johnson & Swain, 1997; Swain & Lapkin, 1982). In brief, research in Canada has demonstrated that: (1) immersion students achieve the same (and in some cases superior) levels of competence in English (reading, writing, speaking, and listening comprehension) as comparable Anglophone students in all-English programs (Genesee, 2004); (2) immersion students also attain the same (and in some cases superior) levels of achievement in academic subjects, such as mathematics, as control students in all-English programs; (3) they achieve significantly higher levels of functional proficiency in French in comparison to English-speaking students in conventional French-as-a-second language classes; and (4) sometimes they achieve the same levels of proficiency in reading and listening comprehension as native French-speaking students, but often non-native-like levels of proficiency in speaking and writing.

Research (conducted primarily in Quebec) has also demonstrated the effectiveness of immersion for students who are disadvantaged in the academic environment of schooling (Genesee, 1984; 2007). There is evidence on: (1) students with low levels of academic ability (Genesee, 1976); (2) students from disadvantaged socio-economic backgrounds (e.g., Holobow, Genesee, & Lambert, 1991); and (3) students from minority ethnic groups – e.g., English-speaking children of Mohawk cultural background (see Genesee, 2004, for a review), groups who often, although not always, underperform in school in comparison to students from mainstream socio-cultural backgrounds. This research has shown that while these students do not do as well as their more advantaged peers, they nevertheless acquire the same levels of competence in English and academic subjects as comparable students in all-English programs and, at the same time, they attain significantly higher levels of proficiency in French.

In contrast to the wealth of empirical evidence concerning the general language and academic outcomes of immersion students, there is little research on individual differences in L2 oral language and reading development of immersion students and, in particular, on students who might be at risk for language and/or reading difficulties (Genesee, 1984, 2007). While many, if not most, children do well in immersion school programs, many face academic challenges, some of which are related to reading and language learning difficulties. In the extreme, some children learning through an L2 have reading or primary language impairments which jeopardize their academic success.

L1 Reading Development

Learning to read typically involves an awareness that words are made up of sounds (phonemes), that sounds can be blended together to form words, and that these sounds can be represented by letters (graphemes). This is followed by attempts to blend grapheme sequences that are recurrent in one's environment, eventually resulting in accurate and fluent decoding of these familiar letter sequences. Extensive research over the last 30 years has indicated that phonological processing is critical in learning to read. As defined by two leading researchers in the area of reading, Wagner and Torgesen (1987), "Phonological processing refers to the use of phonological information (i.e., the sounds of one's language) in processing written and oral language." Wagner and Torgesen were the first researchers to identify and investigate the role of three aspects of phonological processing for word reading: 1) PA, the awareness that words are made up of individual sounds (e.g., blending); 2) phonological recoding, the ability to recode written or visual non-verbal symbols into sounds and access corresponding lexical referents (e.g., rapid naming of sequences of familiar pictures or numbers); and 3) phonological memory, the ability to phonologically code information and store it in short-term or working memory (e.g., backward digit recall). These three components of phonological processing have been shown to be linked to learning both alphabetic (e.g., English) and non-alphabetic (e.g., Chinese) written languages (Gottardo, Chiappe, Yan, Siegel, & Gu, 2006).

Recent meta-analyses by the National Early Literacy Panel (2008) on individual differences in reading and spelling acquisition in children aged zero to five in the United States have further revealed that in addition to these three components of phonological processing, alphabetic knowledge and writing (particularly writing one's name) are strong early (Kindergarten age or younger) predictors of later

(Kindergarten or older) decoding, reading comprehension, and spelling abilities in English. According to the Panel, these five predictors remain at least moderately significant even when the effects of other variables (such as socioeconomic status) are controlled and irrespective of the age at which the predictor or outcome variable is assessed; specifically, they account for 30 to 70% of the variance in reading and spelling at the level of Kindergarten (K) or beyond. Of these predictors, most researchers agree that PA, for example blending ("What does /c/ + /a/ + /t/ make?"), appears to be the most robust predictor of later word decoding ability, accounting for up to 65% of the variance in word reading (Bradley & Bryant, 1983; Ehri, 1999; Hogan, Catts, & Little, 2005; Swanson, Trainin, Necoechea, & Hammill, 2003; Wagner, Torgesen, & Rashotte, 1994; see Ehri & Nunes, 2002 for a review; see NICHD, 2000 for a meta-analysis).

The end goal of learning to read is to extract and construct meaning from print and although text reading cannot proceed without word level reading skills, researchers generally consider word and text reading separately. In fact, most research on reading development has focused on word decoding although there has, most recently, been a surge in interest in reading comprehension. According to the Rand Reading Study Group, a group of reading experts charged with proposing guidelines for the improvement of reading comprehension in American children, reading comprehension requires, in addition to the ability to accurately and fluently decode words, cognitive abilities (e.g., attention, inferencing), motivation, knowledge (e.g., linguistic knowledge, semantic knowledge), and prior experiences (reported in Snow, 2002). The relative contribution of each of these knowledge/skill domains to reading remains largely unspecified because individual studies have generally included only one or a few of these predictor variables. For example, Johnston, Barnes, and Davis (2007) examined the role of attention in various comprehension tasks, while Storch and Whitehurst (2002) examined the contribution of an aggregate of language abilities to reading comprehension. In comparison, a relatively broad set of skills related to reading comprehension was considered in an extensive longitudinal study by Oakhill, Cain, and Bryant (2003). Their study revealed that text integration, metacognitive monitoring, and working memory were the most significant predictors of reading comprehension in children aged 7 to 11 years; other variables considered were reading accuracy, reading rate, vocabulary, PA, receptive grammar, verbal and non-verbal IQ, knowledge of story structure, and mathematical abilities.

Notwithstanding the lack of a detailed understanding of the precise role of specific variables, research on reading comprehension provides evidence that as a student progresses from learning to reading to reading to learn, reading comprehension and listening comprehension are increasingly positively correlated and the role of word decoding skills diminishes (reviewed in Johnston, Barnes, & Desrochers, 2008). For example, in Cain, Oakhill and Bryant's (2004) study, the correlation between word reading accuracy and reading comprehension in the year when school children had their 9th birthday (Grade 4 for most children) was .397, while the correlation between listening comprehension and reading comprehension was .521 in the same year. By the year of their 11th birthday (Grade 6 for most children), the correlations were .194 and .612, respectively.

The degree of correlation that is posited to exist at different ages between decoding accuracy and listening comprehension, on the one hand, and reading comprehension, on the other hand, differs from one study to another, but the presumption that the former two components underlie reading comprehension is largely uncontested. In fact, a very popular theory of reading, the Simple View of Reading (Gough & Tunmer, 1986), proposes that Reading Comprehension is the product of Decoding ability multiplied by Listening Comprehension ability (RC= D x LC). The relationship between decoding and listening comprehension is posited to be multiplicative, rather than additive, because, for example, only the former could fully account for severe reading comprehension problems encountered by individuals who have intact decoding skills but poor listening comprehension. It is proposed that if the relationship were additive, the prediction would be that such a child might do relatively well in the area of reading comprehension.

L2 Reading development

L2 reading research conducted to date has been conducted primarily on learners of English as an L2 and largely on students from minority language backgrounds, for example, native Spanish-speaking students in the U.S. who are learning English as an L2. In a comprehensive and systematic review and synthesis of research on L2 reading acquisition, August and Shanahan (2006) conclude that L2 reading acquisition is similar to L1 reading acquisition in many important and fundamental ways. More specifically, their synthesis of research carried out on studies conducted between 1980 until 2002 indicated that, as is the case for L1 reading, knowledge of print concepts (in L2) and phonological processing abilities (in L1 or L2) are the most significant predictors of word reading in L2. Interestingly, in the only study to have compared monolingual and bilingual children with respect to print awareness, Bialystok (1997) found that bilingual children outperformed monolingual children; that is, the bilingual children had a better understanding of the unchanging nature of the correspondence between print labels and objects and that this was so irrespective of context. Studies comparing the PA skills of these two groups of learners have generally found that L2 learners perform similarly, or in some cases outperform monolingual children (August & Shanahan, 2006). In fact, research comparing the decoding skills of L1 and L2 learners indicates that these groups often do not differ significantly with respect to accuracy (speed was not assessed in any of the studies reviewed). Moreover, and importantly, it has also been found that having reading skills in the L1 and learning to read in an L2 that has transparent phoneme-grapheme correspondences are facilitative factors, presumably due to the process of positive linguistic transfer (Cummins, 2000).

Like L1 learners, both decoding and oral language ability in the language that they are learning to read are necessary components of efficient reading comprehension in L2 learners. However, since L2 learners are more likely to have oral language delays and reduced relevant prior knowledge in their L2 compared to L1 learners, the L1 to L2 skill transfer that occurs at the level of phonological processing and decoding is less likely to occur at the level of reading comprehension. Thus, L2 learners are at increased risk for reading comprehension difficulty while they are generally not disadvantaged in the domain of decoding (August & Shanahan, 2006).

Reading impairment

In the United States, 33% of fourth grade students cannot complete their school work adequately because they struggle with reading (Lee, Grigg, &

Donahue, 2007), while prevalence rates of reading difficulty of 30% have been reported in Canada (EQAO, 2008). Scoring below the 16th to 25th percentile rank is often used as the cut-off for identifying struggling readers (e.g. August & Shanahan, 2006; Catts, Adlof, Hogan, & Ellis Weismer, 2005; Lipka, Lesaux, & Siegel, 2006) and, as a result, the students so identified can include both weak readers who nonetheless fall within the typically-developing range (16th to 25th percentile rank), albeit in the low end of the typical range, and impaired readers who are significantly below age or grade norms (below 16th percentile rank). It is estimated that between 5 and 15% of school-aged children have a reading impairment that is unrelated to limited intellectual ability, sensory deficit(s), or inadequate or insufficient instruction (Lyon, 1995, 1999). Regardless of the causes of reading impairment, the ramifications of not learning to read at age level are far reaching and include lower educational attainment, health status, and income level (Onclin, 2009).

Dyslexia is a specific reading impairment that manifests itself as a difficulty decoding words accurately and fluently despite having received adequate stimulation and instruction and in the absence of low cognitive abilities, visual or auditory impairment, or a concomitant condition that could have a negative impact on learning to read (e.g., attention deficit disorder, depression) (LDAC, 2002). Children with dyslexia often develop reading comprehension problems as a result of inaccurate and slow decoding ability and this, in turn, results in reduced vocabulary and background knowledge (IDA, 2007).

There is strong empirical support for the presence of an underlying phonological processing deficit in children with dyslexia (e.g., August &

Shanahan, 2006; Lyon, Shaywitz, & Shaywitz , 2003; Ramus, Rosen, Dakin, Day, Castellote, White, & Frith, 2003; Torgesen, Wagner, & Rashotte, 1994). Children, be they typically-developing, at-risk, or reading-impaired, who are given training in this type of processing, and especially PA in the case of English, show significant improvements in decoding, at least throughout the elementary years, providing more direct evidence of a causal relationship between phonological processing and reading outcome (NICHD, 2000). Children with dyslexia do not respond well to the support given in a typical classroom; they require intensive, individualized, targeted intervention (NICHD, 2000). Even with this specialized intervention, their difficulties can persist into adulthood, particularly difficulties with reading fluency (Moats & Foorman, 1997). Some researchers further propose that there is a genetic component to reading that interferes with normal phonological processing which is so critical to reading (Castles, Datta, Gayan, & Olson, 1999).

No studies that we know of have actually included groups of L2 learners who would be considered reading impaired (i.e., performing below normal limits). Rather, research to date has tended to include children who are generally functioning within normal limits on reading tasks, with some "poor" or "struggling" readers performing at the low end of the typical range; the latter might be considered at risk for reading impairment, but are not necessarily experiencing reading impairment at the time of the study. Hence our knowledge about L2 reading development and impairment is based exclusively on individual differences. Notwithstanding this limitation, studies comparing prevalence rates of poor decoders among monolingual and L2 learner groups have found similar proportions in both groups (August & Shanahan, 2006).

This information is clinically useful in that it tells us that we should not expect to find more than 15% of a sample of young L2 students who struggle with decoding. Furthermore, closer inspection of the profiles of these students reveals that, other than significantly different levels of L2 oral language proficiency, they are not significantly different from struggling L1 readers. More specifically, both poor L1 and poor L2 decoders have weaknesses in the area of PA and working memory, whereas good decoders in both groups are relatively stronger in these areas (August & Shanahan, 2006). Comparisons of monolingual students and L2 learners who have poor reading comprehension skills (as opposed to poor decoding skills), have found opposite results: reading comprehension in an L2 appears to be correlated largely with L2 oral language ability, with individual factors such as memory, motivation, socio-economic status, home literacy exposure, and experience playing secondary roles (August & Shanahan, 2006). It follows then that we would expect to find that there are higher rates of reading comprehension difficulties than decoding difficulties among L2 learners, and this is indeed the case (August & Shanahan, 2006).

With respect to individual differences in L2 reading acquisition among immersion students, Geva and Clifton (1994) found that there were significant positive correlations between the French and English reading scores of Grade 2 immersion students (on tests of reading accuracy, speed, and comprehension), indicating that immersion students who were poor readers in English were also relatively poor readers in French. MacCoubrey, Wade-Woolley, Klinger, & Kirby (2004) found that measures used to assess risk for reading difficulty in monolingual English students were also predictive of reading difficulty in Grade 2 FI students. Bournot-Trites and Denizot (2005) found that K and Grade 1 immersion students who were considered at risk for reading difficulty according to their performance on a set of English language measures also scored low on a similar battery of French language measures. In a study that was carried out virtually contemporaneously with the present study, Jared and her colleagues (2006) conducted a 4-year longitudinal study of the reading achievement of Anglophone students in FI programs in 3 cities in Canada. This study was broader than previous studies in that the authors examined correlations between L1 and L2 and also attempted to predict reading outcomes. Results from this study indicate that: (1) there were significant correlations between L1 and L2 reading outcomes; (2) English language predictor measures administered in Spring of K accounted for significant, but modest, amounts (up to one third) of variation in Grade 3 French reading outcomes, with different predictors emerging for different outcomes; (3) measures of French ability in K did not improve the prediction of French achievement in Grade 3; but (4) variables related to home environment, and in particular parental education and number of English books, accounted for significant additional variation in French reading outcomes (Jared, Cormier, Levy, & Wade-Woolley, 2006). Only L2 reading outcomes of typically-developing children were tracked in this study; L2 oral language outcomes were not evaluated.

Oral language impairment

An additional challenge for a significant proportion of the school-age population is linked to language impairment. PLI is a difficulty understanding oral language and/or expressing oneself verbally and, as is the case with dyslexia, the difficulty is present in children despite their having received adequate stimulation and in the absence of low cognitive abilities or other types of impairment that could negatively affect language development. The precise cause(s) of PLI remains unknown, but twin studies have provided some compelling evidence that PLI is genetically-based (see Bishop 2002, for a review). Family studies have further revealed specifically that a gene that regulates the activity of other genes--FOXP2--is linked to PLI (Fisher, 2005). Children with PLI exhibit a range of language-related problems, including, for example, reduced vocabulary and poor inferencing abilities. Impairment in the area of grammar is most characteristic of PLI, with children who speak different languages manifesting difficulties that are specific to the grammatical constraints of their language (Leonard, Hansson, Nettelbladt, & Deevy, 2004). For example, in Germanic languages such as English, an extended period of use of non-finite verb forms instead of finite verb forms appears to be the primary shortcoming of children with PLI., with third person present tense markers (e.g., "She sleeps"), regular and irregular past tense markers (e.g., "He jumped", "He slept"), copula and auxiliary "be" forms (e.g., "He is hungry", "He is running"), and auxiliary "do" forms ("Does he want_ a tissue?") being particular areas of difficulty in English (Rice & Wexler, 1996). In French, children with PLI also appear to go through a protracted stage where non-finite forms are used instead of finite forms, resulting in errors with the regular and irregular past tense (e.g., "Il est tombé", "Elle a attendu"). In addition, clitics or object pronouns ("Il la pousse"; "he pushes it") tend to be omitted in obligatory contexts a significant proportion of the time (Crago & Paradis, 2003; Paradis, Crago, & Genesee, 2005/2006). In comparison, in Italian and Spanish, verbal tense marking does not appear to be an area of difficulty for children with PLI; rather, clitic omission errors dominate (Bedore & Leonard, 2001; Bortolini, Caselli, & Leonard, 1997).

Children with PLI typically have heterogeneous language profiles that can include delayed language milestones, difficulty understanding abstract verbal information such as spatial concepts, inferences, and questions, and their expressive language is marked by reduced vocabulary (affecting primarily verbs and category labels), limited discourse skills, and grammatical errors. Not surprisingly, children with PLI struggle with the demands of the classroom and their difficulties increase with age because there tends to be less visual support for learning and more demands on language as they progress from grade to grade. It follows then that children with PLI are at increased risk for academic failure.

There are two primary, competing theoretical accounts of PLI. One popular view holds that individuals with this impairment do not possess appropriate underlying linguistic representations (Clahsen, Bartke, & Göllner, 1997; Crago & Paradis, 2003; Jakubowicz & Nash, 2001; Paradis, Crago, & Genesee, 2004; Rice, 2003; Rice, Wexler, & Cleave, 1995; van der Lely, 2003; Wexler, 2003). This view posits that these children's impairment lies in the cognitive representation of the knowledge that is used to produce and comprehend language, in contrast to the processes that are used to produce and comprehend it. Some supporters of this account, such as Rice, Wexler, and Cleave (1995), have posited that children with PLI are slow to acquire knowledge of the tense-marking rule that states that when conjugated in the past tense, regular verbs *must* be marked using the suffix *-ed*. Others, such as Clahsen, Bartke, and Gollner (1997), argue that knowledge of verb agreement rules, not tense marking, is impaired in children with PLI. More recently, Rice (2003) has argued for a *Disruption-within-Delay* account of PLI whereby aspects of grammar, notably tense morphemes, are more significantly affected than other aspects of language development that are also delayed, such as clausal constituents (indexed by calculating mean length of utterance). Findings of English-speaking children with PLI presenting with pronounced difficulties with third person "-s" but not plural "-s" (Rice, 2003) and French-speaking children with PLI omitting the object pronoun "la" but not the determiner "la" (Paradis & Crago, 2001) are consistent with the this account.

Proponents of the second major view of PLI argue that the language impairments that children with PLI present with are due to cognitive/perceptual processing deficits unrelated to underlying representations of grammar. The *Generalized Slowing Hypothesis* is one such account (Miller, Kail, Leonard, & Tomblin, 2001; Windsor, Milbrath, Carney, & Rakowski, 2001) and posits that children with PLI are generally slower to respond during both linguistic tasks (picture matching, picture naming, grammatical truth value, grammatical judgment, PA) and non-linguistic tasks (tapping, simple reaction time, visual search, mental rotation) than children with typical language. Other processing accounts of PLI posit that children with PLI have an inability or difficulty perceiving rapidly changing acoustic stimuli that may be specific to speech (Leonard, 1998; Leonard, McGregor, & Allen, 1992; Miller, Kail, Leonard, & Tomblin, 2001; Uwer, Albrecht, & von Suchodoletz, 2002; except see Tallal & Piercy, 1973, 1974, 1975; Tallal, Stark, Kallman, & Mellits, 1981; Tallal & Stark, 1981 for contrary points of view on this point), or with stimuli that are very brief in duration, for example Leonard's *Surface Hypothesis* (1998). Yet other processing accounts of PLI suggest that it is a limitation in the area of working memory that underlies the language deficits of children with PLI (Baddeley, 1992; Daneman & Carpenter, 1980; Gathercole & Baddeley, 1990; Just & Carpenter, 1992).

There have been surprisingly few studies that have attempted to identify predictors of PLI. Variables found to be significant predictors of language impairment have included narrative retelling, where children with PLI have been shown to have difficulty expressing semantic relationships and presenting information in the correct sequence (e.g., Bishop & Edmundson, 1987); IQ and social-emotional status, with children with lower nonverbal abilities and greater behavioural problems being more likely to present with language problems that persist (e.g., Schery, 1985); receptive language, where children with such difficulties have a poorer language prognosis (e.g., Paul, Cohen, & Caparulo, 1983); speech processing, where children with PLI do more poorly than controls, particularly in noisy conditions (Ziegler, Pech-Georgel, George, Alario, & Lorenzi, 2005), and phonology, where children with phonological difficulties during the preschool years are more likely to present with PLI years later (e.g., Aram, Ekelman, & Nation, 1984; but see Bishop & Edmundson, 1987, for an opposing view). However to date, phonological and verbal memory (namely non-word repetition and sentence repetition) (Bishop, North, & Donlan, 1996; Conti-Ramsden, Botting, & Faragher, 2001) and use of verb morphology (Bedore & Leonard, 1998; Leonard, Miller, & Gerber, 1999; Rice, 2003; Rice & Wexler, 1996) have overwhelmingly been identified as the most significant predictors of PLI in English-speaking children. Language test batteries used by speech-language pathologists generally include verb morphology tasks, whereas phonological memory tasks have been included less systematically in such batteries, though there appears to be an increase in the inclusion of such tasks in language tests in recent years. In the only study to have directly compared non-word repetition and sentence repetition, Botting and Conti-Ramsden (2001) provided evidence that of the two, sentence repetition may be the most significant predictor and, unlike non-word repetition which has been found to be predictive of autism (Kjelgaard & Tager-Flusberg, 2001) and Down syndrome (Jarrold, Baddeley, & Hewes, 2000), sentence repetition holds promise as a marker that is unique to PLI.

Even fewer studies have attempted to identify predictors of language impairment in L2 learners, and this research has been limited to speakers of Spanish, Catalan, and English. To date, the measures found to be most predictive of language impairment in L2 learners are non-word repetition and use of verb morphology and, in the case of Spanish and English, there is evidence to suggest that a combination of both of these measures might yield the highest levels of sensitivity and specificity (Gutierrez-Clellen & Simon-Cereijido, 2007, 2010; c.f. Conti-Ramsden, 2003, for evidence that non-word repetition and past tense marking combined may best predict language impairment in monolingual English learners). Gutierrez-Clellen and Simon-Cereijido, (2007) have demonstrated that the Test of English Morphosyntax, a verb morphology test, was sensitive and specific to the identification of language impairment among bilingual Prekindergarten and K children. Building on the work of Girbau and Schwartz (2007) who argued that non-word repetition was a reliable identifier of language impairment in Spanish speakers, Gutierrez-Clellen and Simon-Cereijido (2010) subsequently administered non-word repetition tasks to early elementary school

Spanish-English bilingual children with or without language impairment and found that the discrimination accuracy was greatly improved when the task was administered in each language rather than only in the dominant language and, furthermore, their data revealed that it was best to avoid using non-word repetition alone to identify language impairment in bilingual children as doing so significantly increased the risk of under-identifying children with language impairment (i.e., sensitivity was poor).

Studies that have focused on bilingual children, in contrast to L2 learners, have focused on outcomes rather than predictors. These studies have revealed that to the extent that a child with language impairment can learn one language, they can learn two (Gutierrez-Clellen, Simon-Cereijido, & Wagner, 2008; Paradis, Crago, Genesee, & Rice, 2003). That is, the area of language that is affected and the severity of the language impairment do not differ when the language abilities of a bilingual child are compared to those of a monolingual child. For example, in their study involving children raised in (simultaneous) bilingual French-English households, Paradis et al. (2003) compared 7- year old children with PLI to monolingual French and English children with PLI with respect to their use of tense-bearing and non-tense-bearing morphemes. Their findings were that the bilingual group struggled with the same grammatical aspect features (i.e., tense-bearing but not non-tense-bearing morphemes), and they did so to the same extent as their monolingual counterparts. Gutierrez-Clellen et al. (2008) obtained similar findings with Spanish-English bilingual children and, furthermore, their study revealed that bilingual children with PLI (children with language impairment who had been receiving input in both languages for a significant amount of time) did not differ from typically-developing L2 learners (children still in the process of acquiring an L2) with respect to the area of language affected or the severity of the language difficulty.

The latter finding underscores the importance of making a distinction between bilingual children whose exposure to both languages has been sustained and significant and L2 learners who have incomplete language acquisition. This point is further highlighted in a study that involved L2 learners with PLI who were attending language programs in England (Crutchley, Botting, & Conti-Ramsden, 1997). According to the authors, the L2 learners with PLI in this study appeared to be disadvantaged linguistically in comparison to their monolingual peers, a finding that is expected when we consider that one would not expect any L2 learner, be they typically developing or presenting with PLI, to be as proficient linguistically as their bilingual and especially their monolingual counterparts.

There is only relatively dated and contradictory evidence concerning the performance of immersion students suspected of having language impairment (Bruck, 1978, 1982; Trites & Price, 1978, 1979, 1984; see Genesee, 2007, for a review). Bruck (1982) found that Grade 3 students with delays (and possibly impairments) in L1 acquisition were not differentially disadvantaged in immersion programs in comparison to students with similar L1 profiles who attended all-English programs. The groups were identified in K using teacher ratings of language difficulty, an oral interview, and a battery of IQ, language, and memory tests. At the same time, the impaired immersion students attained levels of academic achievement that were comparable to those of impaired non-immersion students, and they achieved enhanced competence in French.

However, Bruck's study was not longitudinal and her findings warrant replication using definitions and assessment tools that reflect contemporary knowledge about language impairment. In contrast to Bruck's findings, Trites and Price (1978, 1979), as well as Wiss (1989), have argued that there is a specific sub-group of learning disabled students who have delays in cognitive and perhaps even neurological development in areas of the brain that are implicated in L2 acquisition and, as a result, they are not suitable candidates for early immersion, although they may be suitable for late immersion. However, Trites's results have been criticized extensively on methodological and logical grounds (Cummins, 2000; Genesee, 2006; Stern et al., 1976). Neither set of studies identifies predictors of risk for L2 oral language development.

Reading impairment versus oral language impairment

Research conducted over the past 30 years has sought to understand the relationship between dyslexia and PLI. Practically speaking, professionals working with these children need to address each child's specific intervention needs in order to ensure maximum responsiveness to intervention. Despite the importance of this issue, there is relatively little research on the relationship between PLI and dyslexia, although it is growing. More specifically, the following research questions have been posed: Does one cause the other? Are they separate points along a continuum of severity? Do they represent domain-specific manifestations of the same underlying deficit(s)? Or, are they distinct disorders with different underlying deficits and behavioural manifestations? If they reflect different underlying impairments, why do they co-occur so often?

Longitudinal studies by Bishop and Adams (1990) and Tallal, Allard, Miller, and Curtiss (1997) examined the language and literacy skills of young school-aged children who were initially diagnosed with PLI prior to school entry and found that, as a group, children with PLI generally demonstrated significant reading difficulties by age 8. The authors' conclusions were that PLI and dyslexia were located along the same continuum and that they differed primarily with respect to the age (Bishop & Adams, 1990) of the child or the severity of the deficits (Tallal et al., 1997). The children in Bishop and Adam's (1990) study presented with PLI at 4 years of age, and they were subsequently found to struggle with reading comprehension, in addition to oral language, at 8 years of age. However, these children did not struggle with reading accuracy and, therefore, their difficulties would not fall under the classical definition of dyslexia. Scarborough and Dobrich (1990) similarly followed children with language impairment from 2 to 7 years of age and found that while most children seemed to outgrow their language impairments, this was in many instances replaced by reading impairment. They too concluded that PLI and dyslexia were disorders located along a continuum that varied with respect to age, but more specifically, that dyslexia appeared to be a resolved form of PLI. However, and again, including children who outgrew their PLI goes beyond the classic definition of PLI where the disorder persists throughout an individual's lifespan.

A different variant of the continuum view of PLI and dyslexia has been proposed by van Alphen, de Bree, Gerrits, de Jong, Wilsenach, and Wijnen (2004), Kamhi and Catts (1986), and Rispens and Been (2007). These researchers all examined the oral language and literacy skills of children with PLI, children with or at-risk for dyslexia, and control children. These three teams of researchers all concluded that PLI was a more severe form of phonological processing impairment than dyslexia. However, in a recent study, Fraser, Goswami, and Conti-Ramsden (2010) obtained different results when they compared 7- to 9-year-old children with PLI and/or dyslexia and age-matched controls on a battery of measures that included phonological processing, non-phonological language processing, and auditory processing tasks. In the latter study, children with dyslexia only, PLI only, and dyslexia and PLI all presented with phonological impairments and only the mixed group performed significantly below the other two; the dyslexia only group did not present with impairments in the area of non-phonological language tasks whereas the language impairment group did. The results of the latter study suggest that children with PLI may have broader difficulties than children with dyslexia.

In contrast to studies that argue for common underlying difficulties in reading and oral language impairment (in LI), other studies argue for distinct underlying difficulties. More specifically, a study by Botting, Simkin, and Conti-Ramsden (2006) followed children diagnosed with PLI at 7 years of age until 11 years of age and collected data on their oral language and literacy skills. They found that 67% of the children scored more than one standard deviation below the mean on a measure of reading accuracy and 80% scored more than one standard deviation below the mean on passage comprehension when they were 11 years of age, suggesting that language and literacy are separate constructs in children with PLI (or what they refer to as SLI), which in turn suggests that language and literacy impairments, while clearly closely related, may not be completely overlapping in this population.(see Wong, Kidd, Ho, & Au, 2010, for similar findings involving Cantonese speakers).

Others have also argued for the distinctiveness of PLI and dyslexia. Goulandris, Snowling, and Walker (2000) assessed the oral language and literacy skills of adolescents with dyslexia, with PLI, with resolved PLI, and controls. They reported the following results: a) phonological processing impairments in dyslexia, persistent PLI, and resolved SLI groups; b) poor decoding and spelling abilities in dyslexia and persistent PLI groups, but not in the resolved PLI group and; c) oral language deficits in the persistent PLI group, but not in dyslexia or resolved PLI groups. On the basis of these findings they concluded that language impairment did appear to be a risk factor for dyslexia. However, since the children with dyslexia had better reading comprehension than the children with persistent PLI and the children with resolved PLI did not have impaired reading abilities, the authors deduced that there had to be an additional as of yet unidentified separate impairment at play in dyslexia that did not exist in PLI. They suggested that the unidentified impairment could be impairment in the ability to create grapheme-phoneme links (see de Bree & Kerkhoff, 2010, for similar findings involving Dutch speakers). Studies by Catts, Fey, Tomblin, and Zhang (2002) and Catts, Fey, Zhang, and Tomblin (2001) compared groups of children with PLI or dyslexia, with or without concomitant cognitive deficits, and found that, although there was indeed a statistically significant relationship (i.e. overlap) between PLI and classical dyslexia, this relationship appeared to be much stronger when non-verbal cognitive deficits were present, suggesting as others have (Snowling, Bishop, & Stothard, 2000), that IQ may serve as a protective factor against reading deficits, at least in children with PLI.

Notwithstanding the valuable empirical evidence and conceptual insights these studies provide, they all suffer from important methodological limitations that are related primarily to subject selection. More specifically, the samples in most of these studies were preselected for the presence of PLI, and selection did not take into account the possibility of concomitant reading difficulties or risk for reading difficulties. As such, it was possible to examine if PLI is associated with relatively poor reading outcomes later on, and this is indeed what was shown; but, it was not possible to determine whether PLI is necessarily a pre-requisite to reading impairment. The only way to do this would be to control for reading ability *at each point in time* throughout the course of a study; this was not done by any of the research teams whose work has been reviewed here.

A second important limitation of much of the research in this area is that of ascertainment bias. The fact that the PLI and dyslexia samples selected for study were generally comprised of children with severe deficits means that it is likely that they were more globally affected than children with these conditions in the population at large and, as a result, the studies reviewed may lack generalizability. One way to circumvent this issue would be to randomly select participants from the population rather than preselecting them on the basis of a clinical diagnosis because the latter method necessarily implicates children whose difficulties are relatively severe, severe enough at least to get the attention of clinicians.

The important issue of how researchers define dyslexia is a third significant limitation of many of these studies. Some authors included in their reading impaired group children with reading comprehension deficits in the absence of decoding deficits. As was discussed earlier, it could and has been argued that these poor comprehenders are in fact children with oral, not written, language deficits (Cain, Oakhill, & Bryant, 2000; Catts, Adlof, & Ellis Weismer, 2006; Nation, Adams, Bower-Crane, & Snowling, 1999; Nation & Snowling, 1998; Stothard & Hulme, 1995). If this assumption is correct, then researchers who included these children in their dyslexia samples may inadvertently have included children who should in fact have been assigned to the PLI group. In addition, a significant number of the studies reviewed here appear to have included children who outgrew their PLI. This is problematic because, by definition, PLI is a condition that persists over time.

A set of two studies by Catts et al. (2005) virtually eliminated the issue of ascertainment bias by quasi-randomly selecting their subjects. Their first study compared rates of PLI in K children with rates of dyslexia in the same children in Grades 2, 4, and 8. They found that there was only a small, albeit statistically significant, overlap between children with PLI and those with dyslexia, and the authors argued that this was most probably due to chance comorbidity in most cases. Unfortunately, the children's language and pre-reading/reading skills were not monitored across the grades. As a result, it is not clear how many of their K children might also have had or were at risk for reading impairment at the outset of the study. Were this the case, it would inflate the co-occurrence of dyslexia and PLI later on. Pre-reading/reading skills were monitored throughout the grades in their second study where they compared the phonological processing skills of children with PLI only, children with dyslexia only, children with both PLI and dyslexia, and controls. In this study, they found that children with dyslexia only or with both dyslexia and PLI scored significantly lower than children with PLI only or controls on phonological processing tasks. Thus, the children with dyslexia only or both dyslexia and PLI had impaired phonological processing abilities, in contrast to the children with PLI or controls. However, the language skills of the children were not assessed beyond K, making it possible that some children with language impairment may have been missed if their language profiles changed over time. Nonetheless, if Catts et al.'s (2005) postulation is valid -- that children with PLI and dyslexia have difficulties that are distributed in a continuous fashion to the borderline regions of PLI and of dyslexia -- we should expect that only a few children with PLI would present with weak reading abilities and, similarly, only a few children with dyslexia would present with weak oral language abilities, and we should therefore make deliberate efforts to include evaluations of these areas in our clinical assessments and provide therapy accordingly.

In summary, on balance and taking methodological issues into account, evidence appears to support the existence of, at a minimum, partial distinctiveness of PLI and dyslexia. Though additional research is necessary to confirm this, phonological processing is a likely candidate for the difficulties that underlie dyslexia but not PLI. A better conceptualization of PLI and dyslexia, therefore, may be one that accommodates the possible existence of three separate conditions: PLI, dyslexia, and PLI with concomitant dyslexia. Such a model has been proposed by McArthur, Hogben, Edwards, Heath, and Mengler (2000). It follows from such a model that children presenting with both conditions should receive therapy that attends to both oral and written language deficits. Alternatively, clinicians and researchers might also consider the possibility that the link between PLI and reading may be bifurcated with PLI being related to reading comprehension deficits rather than decoding deficits.

No studies that we know of have addressed the issue of overlap in reading and language impairment in L2 learners and yet L2 learners are at increased risk for academic difficulty and under-identification and as such they would benefit greatly from early intervention that is targeted to their specific needs.

The present studies

Successful education of children who are at risk for oral language or reading impairment requires early identification and the provision of early additional support that is specific to their learning difficulties/impairment, be it related specifically to reading or to oral language. Early identification is key in so far as the achievement gap between typically-developing and learning-disabled children is relatively small early on, and tends to increase with age (Scanlon et al., 2008). However, the identification of such children is complicated by the fact that it is difficult to distinguish between poor performance in language and/or reading development that is related to underlying impairments of a clinical nature versus those that reflect individual differences in or incomplete mastery of the L2, the language of instruction. In other words, school children being educated through an L2 who are performing at the low end of the spectrum in oral language and/or reading can include both students with underlying impairments related to reading or oral language and students experiencing the typical challenges of L2 learners.

The present studies extend our understanding of reading and oral language development of children who are educated in their L2 by addressing a number of outstanding questions, namely: 1) Can we differentially predict L2 decoding versus reading comprehension ability using L1 measures and if so, how early can we do this?, 2) What is the relationship of decoding and listening comprehension to reading comprehension when this is examined cross linguistically?, 3) Are L2 oral language and reading difficulty distinct? And, 4) Is it possible to accurately predict students who are at risk for oral language and/or reading difficulty early on at a time where L2 proficiency is limited?; In addition to deepening our understanding of issues in L2 reading and oral language development and the relationship of oral language and reading development cross-linguistically, the present research is important because answers to these questions will make it possible to provide crucial early and targeted intervention for at-risk children learning through an L2. While much is known about early identification of L1 learners with reading and oral language difficulties, research on L2 learners with such difficulties is scarce, placing these children at increased risk for delayed identification or misidentification. To address these questions, we administered an extensive battery of oral language and reading-related predictor measures in English to a group of native English-speaking (anglophone) students at the start of total FI (i.e., Fall of K) and subsequently at the end of K (i.e., Spring). The measures we administered have all been found to be predictive of oral language and/or reading development in English-as-a-first-language in previous studies. A battery of French oral language and reading-related outcome measures was subsequently administered to the same group of students at the end of Grade 1; see Figure 1.

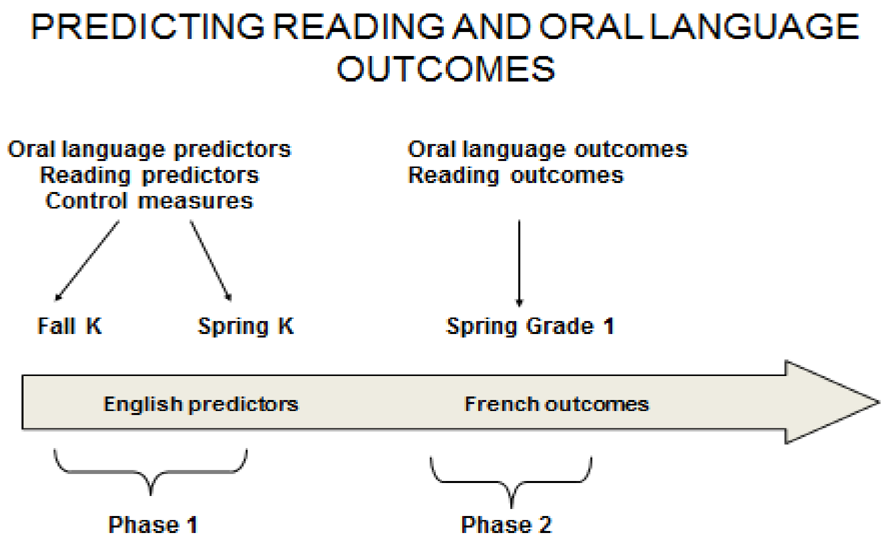

FIGURE 1

In Study 1, we examined the relationship between the children's scores on the K English language predictor tests and their scores on the decoding and reading comprehension tests administered in French, their L2, at the end of Grade 1 in order to determine the extent to which the K predictors predicted the Grade 1 outcomes and which were the best predictors of decoding versus reading comprehension outcomes. A broader set of reading and oral language predictors were included in the present study than in previous studies in order to ascertain which specific English-L1 predictors play a significant role with respect to the development of L2 decoding and reading comprehension abilities and how this relationship might differ in comparison to L1 reading. We also administered the predictor tests earlier than has been done previously (i.e., in Fall of K) in order to determine how early in the program significant predictions of subsequent reading development are possible. This was deemed important in order to determine how early in their education L2 learners who are at risk for reading difficulty can be identified and, in a related vein, how early intervention for at-risk learners can begin. Educators often adopt a "wait-and-see approach" in order to be confident that the difficulties that L2 students are experiencing are due to underlying impairments and not simply incomplete acquisition of the L2. Such an approach, however, puts such learners at greater risk for failure since it results in delaying delivery of crucial intervention. Study 1 extends the findings of previous studies on individual differences in L2 reading development by examining the role of prior exposure to the L2 in a context where, as is often the case worldwide, most children have had at least some exposure to the L2 prior to school entry. Lastly, the data from Study 1 allowed us to examine whether the Simple View of Reading (Gough & Tunmer, 1986) applies cross-linguistically as well as intra-linguistically.

Study 2 focused more directly on struggling L2 learners. More specifically, Grade 1 immersion students who were struggling in L2 oral language and/or reading development were identified using their performance on the oral language and reading outcome tests administered in French at the end of Grade 1. Three categories of struggling students were thus identified: (1) oral language only; (2) reading only, and (3) both oral language and reading. All other students were considered typically developing and their results were used as comparison data. Discriminant analyses were then conducted in order to identify which K L1 reading and oral language predictor tests were best able to differentiate the struggling and typically-developing subgroups in each category. In this way, we sought to identify which K English language measures were most predictive of reading and oral language difficulty. This study is unique in its inclusion of L2 readers in FI programs who would be considered to be impaired rather than simply low-performing but within the typical range. This is the only study we know of to examine the differential prediction of reading versus oral language difficulty and the extent to which these are different or overlapping profiles in L2 learners.

Study 1

Individual Differences in Second Language Reading Acquisition: A Study of Early French Immersion Students [1]

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Abstract

This study examined whether individual variance in letter-name knowledge and phonological processing assessed in English (L1) in Kindergarten (K) French Immersion (FI) students predicts their French (L2) decoding and reading comprehension scores at the end of Grade 1; whether L2 oral language factors also contribute significantly to predictions of variability in L2 reading outcomes beyond knowledge of the alphabet and phonological processing; and whether the Simple View of Reading (SVR) (Gough & Tunmer, 1986) applies cross-linguistically as well as intra-linguistically. We administered a comprehensive battery of predictor tests that have been correlated with L1 decoding and comprehension skills in English to English-speaking students in early total FI at the beginning and end of K. Tests of word and pseudo-word decoding and reading comprehension in French were given at the end of Grade 1. The best K predictors of L2 decoding were knowledge of the alphabetic principle in English, PA in English, and knowledge of French at K entry. The same variables were significant predictors of French reading comprehension, with the added contribution of scores related to oral language skills in L1. The results provide support for the SVR intra-linguistically, but not cross-linguistically.

Introduction

French Immersion (FI) programs were first introduced in Canada in St. Lambert, Quebec, in 1965. The St. Lambert program was an early total immersion program in French so that the participating students received all instruction, including initial reading and writing instruction, in French from Kindergarten (K) until the end of Grade 2 at which time English was introduced in the form of English language arts instruction. At the time that it was first introduced, immersion education was regarded as a radical departure from conventional education because, among other reasons, students received initial literacy instruction in a language that they were not proficient in. Research conducted on the outcomes of immersion since its inception has found that the participating students attain the same levels of achievement in reading and writing in English as native English-speaking students attending English language programs, although they may experience short term lags in literacy development during those grades when French is used as an exclusive language of instruction (Genesee, 1978; Lambert & Tucker, 1972; Swain & Lapkin, 1982). Immersion students have also been found to demonstrate the same levels of proficiency in listening and speaking in English as their peers instructed through English (see Genesee, 2004, for a recent review). At the same time, immersion students attain a level of proficiency in all aspects of French as a second language (L2) that is superior to that of English-speaking students who receive language arts instruction in French for short periods each day.

Research has also examined the suitability of immersion for students who have academic difficulty in school and who tend to attain relatively low levels of achievement, namely students with low levels of intellectual/academic ability and with poor first language abilities and students from disadvantaged socio-economic and minority ethnic group backgrounds. These studies have found that such students achieve the same levels of achievement in reading and writing in English as comparably disadvantaged students in all-English programs (see Genesee, 2007 for a review) and, at the same time, they achieve higher levels of proficiency in reading and writing in French than similar students in conventional French-as-a-second language classes. Aside from these studies, there is relatively little empirical investigation of individual differences in achievement among FI students and, in particular, individual differences in reading achievement. Learning to read is critical for ensuring academic success in school because beyond the primary grades reading is essential for learning academic subject matter and skills. Reading is equally, if not more, important in immersion because, despite the overall success of students in reading achievement, as just noted, there is a high rate of attrition from immersion programs, in part at least, due to reading difficulty (e.g., Halsall, 1994; Hogan & Harris, 2004; Obadia & Thériault, 1997; Parkin, Morrison, & Watkin, 1987).

Understanding individual differences in the reading achievement of immersion students early in their education is critical for determining the suitability of immersion for students who might experience difficulty learning to read in French L2 and for both the early identification of those at risk for reading difficulties and impairment and planning differentiated instruction and intervention for students who require additional support to avoid developing chronic reading difficulties. Early identification and early targeted intervention have been found to maximize response to intervention (e.g., Scanlon, Gelzheiser, Vellutino, Schatschneider, & Sweeney, 2008) and to help prevent reading difficulties altogether (e.g., Scanlon, Anderson, & Flynn, 2008). The study of individual differences in L2 reading acquisition also implicates important theoretical issues, including the extent to which first language (L1) and L2 reading acquisition are the same and/or different and in what ways they are the same and different; and, of chief concern in the present study, whether and which L1 abilities are related to L2 reading acquisition and to what extent they are related.

The goal of the present study was to examine the role of L1 skills in explaining individual differences in L2 reading attainment in native English-speaking students in early FI. Aside from its contribution to our understanding of cross-linguistic issues in reading acquisition, understanding the role of L1 skills in L2 reading acquisition is important for practical reasons; such as whether indices of L1 ability can be used to predict L2 reading outcomes and how early in schooling reliable predictions of risk for reading difficulty can be made cross-linguistically. The use of L1 indices to identify individual differences in reading achievement in immersion students would facilitate early identification and intervention of immersion students who might need additional support to acquire L2 reading skills successfully before their French skills are sufficiently developed to permit accurate assessment.

Individual Differences in First Language Reading Acquisition

There is an extensive body of research on correlates and predictors of individual differences in L1 reading acquisition with a preponderance on early stages – that is, word decoding, and much less attention to later stages that implicate comprehension. Whether focusing on decoding or reading comprehension outcomes, studies vary widely with respect to the range of predictor variables they have considered and whether they take a prospective or concurrent approach to predicting individual differences. Most studies of word decoding have included measures of phonological processing and a measure of knowledge of the alphabetic principle, with some studies also including indices of cognitive ability, oral language ability, and perceptual skills (auditory, visual), among others. Phonological processing includes an overlapping but partially distinct set of skills: phonological awareness (PA), the most studied phonological processing skill (often measured using blending or elision tasks); phonological access (often measured using rapid automatized naming tasks); and phonological memory (often measured by sentence repetition or backward digit recall tasks) (Wagner & Torgesen, 1987). Despite some variation, in the aggregate, studies of L1 decoding of real or pseudo-words indicate that phonological processing abilities along with knowledge of the alphabetic principle (letter-sound/name knowledge) are the most important predictors of decoding ability (e.g., Bowey, 2005; NICHD, 2000; Schatschneider, Fletcher, Francis, Carlson, & Foorman, 2004). The predictive power of these two variables has been impressive. Specifically, studies have found that letter-name knowledge may account for between 25 and 35% of variance in word decoding ability up to one year later (e.g., Bowey, 1994; Schatschneider, et al., 2004). The predictive role of phonological processing has been found to be at least as important as that of letter-name knowledge, with performance on tasks such as blending, sentence repetition, and rapid automatized naming in K predicting up to 40% of the variance in word reading at the end of Grade 2. Of the phonological processing skills, PA has overwhelmingly been identified by researchers as the most significant predictor of word reading (NICHD, 2000). Recent evidence suggests further that, among the various measures of PA, small-unit measures (e.g., individual phonemes) may be particularly good predictors of later reading outcomes as compared to larger unit measures (e.g., syllables) (National Institute for Literacy, 2008).

Vocabulary has also been found to be an important predictor of decoding in many studies, but there is evidence suggesting that its role may be negligible when age and IQ are adequately controlled (Byrne & Fielding-Barnsley, 1993; McGuinness, 2005). This makes sense when we consider that receptive vocabulary is the subtest that is most highly correlated with performance IQ (Sattler, 1988), as pointed out by Byrne (1998). The evidence for a predictive role of vocabulary with respect to later stages of reading, namely reading comprehension, is more robust (NICHD, 2000; Schatschneider et al., 2004).

Although much less research has been carried out on reading comprehension and, thus our understanding of L1 reading comprehension is still emerging, extant findings suggest that the picture with respect to individual differences in L1 reading comprehension is more complex than that for decoding and that the factors that correlate with individual differences in reading comprehension may differ at different stages of development (Johnston, Barnes, & Desrochers, 2008). Storch and Whitehurst (2002), for example, found that the most significant predictors of comprehension accuracy in the primary grades were word-related reading skills (i.e., PA and letter knowledge), but that oral language skills (i.e., vocabulary, narrative recall, and syntactic ability) were significant predictors of comprehension in Grades 3 and 4. The Simple View of Reading (SVR; Gough & Tunmer, 1986), one of the earliest and still most popular theories of reading comprehension, emphasizes these two component skills. Briefly, according to the SVR, reading comprehension (RC) is equal to the product of decoding (D) and language comprehension (LC); that is, RC= D x LC (Hoover & Gough, 1990). However, others, including Chen and Vellutino (1997) and Savage and his colleagues (Kirby & Savage, 2008; Savage, 2006; and Savage & Wolforth, 2007) have been unable to replicate the multiplicative effect with English L1 learners. Close inspection of Hoover and Gough's original report reveals that their theory was based on findings from a cohort of English-L2 learners. Taken together, these findings argue for an additive model of reading acquisition in English-L1 children (Chen & Vellutino and Savage and colleagues' data) and a multiplicative model in English-L2 readers (Hoover & Gough data). Studies of reading comprehension in students in even late elementary grades (Grade 5 and later) suggest that even higher order skills, such as inference-making ability, comprehension monitoring, and sensitivity to story structure, play a significant role in comprehension of advanced level texts (Cornoldi, DeBeni, & Pazzaglia, 1996; Muter, Hulme, Snowling, & Stevenson, 2004; Oakhill, Cain, & Bryant, 2003).

Individual Differences in L2 Reading Achievement

Studies of L2 reading acquisition have sought to determine if the same factors that are linked to individual differences in L1 reading achievement are also related to L2 reading achievement and whether there are cross-linguistic influences in L2 reading acquisition (e.g., see August & Shanahan, 2006, and Genesee, Lindholm-Leary, Saunders, & Christina, 2006, for reviews of research on English language learners; and Genesee & Jared, 2008, for a review of FI). A number of researchers have reported significant correlations between reading achievement in English and French of English-speaking students in FI programs. More specifically, Geva and Clifton (1994) report concurrent correlations of more than .70 between English L1 and French L2 measures of passage reading accuracy, passage reading time and retelling, and word identification in a study of Grade 2 total FI students. Similarly, Comeau, Cormier, Grandmaison, and Lacroix (1999) found that word identification scores for FI students were highly correlated across languages (.84 for students in Grades 1, 3, and 5 combined, and .87 one year later), as did Deacon, Wade-Woolley, and Kirby (2007), who obtained cross-language concurrent correlations of .85 in Grade 1, .74 in Grade 2, and .77 in Grade 3. In a related vein, Bournot-Trites and Denizot (2005) found that K and Grade 1 immersion students who were considered at risk for reading difficulty according to their performance on English 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 French language tests.

Studies of predictors of individual differences in reading achievement in FI students have reported evidence of cross-linguistic effects in correlations between the component skills that are thought to support reading development and measures of reading achievement itself. In an early study, Comeau et al. (1999) found that scores on tests of PA in English and in French, phonological short term memory in English, and phonological access in English, administered in Grades 1, 3, and 5, were all significantly correlated with word decoding skills in French and English one year later. As has been found in studies of L1 reading achievement, PA scores in either language accounted for almost 74% of the variance in French word identification scores after age, gender, nonverbal IQ, phonological access (in English), and non-word repetition (based on English) were taken into account. The same predictors (averaged across the three grades) accounted for 80% of variance in English word identification scores (see also Deacon et al., 2007). MacCoubrey, Wade-Woolley, Klinger, and Kirby (2004) found that PA skills in English of Grade 1 total FI students were the best discriminators of students who were successful and those who were poor English word readers, whereas both phonological access and PA in English discriminated between successful and at-risk readers of French words.

Tingley, Dore, Lopez, Parsons, Campbell, Kay Raining-Bird, and Cleave (2004) examined which specific PA skills (syllable, onset-rime, phoneme) were correlated with the French and English decoding of K and Grade 1 FI students. They observed that onset-rime and phoneme awareness scores were correlated significantly with word and non-word reading scores in both English and French However, syllable awareness was significantly correlated only with performance on French-derived non-words. Syllable awareness may be particularly important for French word decoding because French is a syllable-timed language. Although most attention has focused on PA as a predictor of subsequent L2 reading ability, Deacon et al. (2007) argue that morphological awareness skills may also be important in accounting for individual differences in French L2 reading achievement. They found that morphological awareness skills in French, assessed using a past tense analogy task, accounted for significant variance in the French word identification scores of Grade 1 to 3 immersion students and in the English word identification skills of Grade 1 and 2 students.

Jared, Cormier, Levy, and Wade-Woolley (2006) have conducted an extensive longitudinal study of individual differences in reading achievement in early FI students in three largely monolingual English urban centres in Canada (London, Moncton, and Hamilton). They examined the English-L1 and French-L2 reading outcomes (word decoding and comprehension) of FI students from K to Grade 3. Jared and her colleagues found that PA, phonological access, and word reading assessed in English in the Spring of K were the best predictors of Grade 3 French decoding, whereas non-verbal IQ, receptive grammar, and PA were the best K predictors of Grade 3 French reading comprehension, in this order of importance, respectively. Immersion students' knowledge of French (i.e., French vocabulary) at K entry did not correlate significantly with reading outcome, arguably because the students had had so little exposure to French that there had to be insufficient variance in French knowledge to serve as a significant correlate of later reading. Prior knowledge of French might play a more significant role in French L2 reading acquisition among students living in settings such as Montreal, where French is prevalent. In fact, the role of L2 vocabulary with respect to L2 decoding abilities is unclear. Some studies have found that L2 vocabulary contributes significantly and uniquely, albeit modestly, to the prediction of L2 decoding (Abu-Rabia, 1997; Arab-Moghaddam & Sénéchal, 2001; Da Fontoura & Siegel, 1995; Gottardo, 2002; Muter & Diethelm, 2001), while others have not (Geva, Yaghoub-Zadeh, & Schuster, 2000; Jared et al., 2010; Quiroga, Lemos-Britten, Mostafapour, Abbott, & Berninger, 2002). In contrast to the studies reported above and to the present study, over 70% of the children in the Jared study received simultaneous literacy instruction in English and French, beginning in K. As a result, some of the cross-linguistic effects reported by Jared may have been due to simultaneous literacy instruction in both languages.

The Present Study

The present study is part of an ongoing longitudinal examination of the reading achievement of English-speaking students in an early total FI program outside Montreal. When completed, the same students will have been assessed in Fall and Spring of K and in the Spring of Grades 1 to 3. The results presented here pertain to the first phase of testing (Fall of K to Spring of Grade 1) and focus on word decoding skills and early comprehension skills in French. The study addresses a number of unexplored issues and also provides useful replication of results from current studies. Like other studies reviewed earlier, we examined the extent to which L1 reading-related skills (i.e., PA awareness and letter-sound knowledge) predict L2 word decoding. We focused on immersion students who were taught initial literacy skills in French only permitting us to examine cross-linguistic effects on L2 reading acquisition that are not influenced by dual language literacy instruction, as was the case in Jared et al.'s (2010) study. Our predictor measures were administered in the Fall and Spring of K permitting us to examine how early in schooling significant and reliable predictions of French-L2 reading outcomes can be made. To date, no other study has examined predictors of L2 reading achievement among FI students from such an early age. The earlier the prediction of risk for reading difficulties, the earlier individualized intervention can be provided (Scanlon et al., 2008b) and the better the chances of avoiding later reading failure (Scanlon et al., 2008a). We included a broad range of oral language measures along with measures of phonological processing and letter-sound knowledge in order to determine whether and which oral language skills contribute significantly to predictions of French reading outcomes. While it is widely thought that oral language skills are critical for acquisition of reading skills in an L2, at present, we have little understanding of which oral language skills are important and whether the same kinds of oral language skills are important in early and later stages of reading acquisition. Better understanding of which oral language skills are important for L2 reading acquisition would increase the accuracy with which struggling readers could be identified and, as well, would serve to help define the kinds of interventions that would be most effective when providing additional support to struggling readers (NICHD, 2000). Conducting the study in Quebec permitted us to examine the role of prior L2 exposure. In fact, a number of children in our study had some working knowledge of French, although all were English dominant. Some knowledge of the target language prior to schooling is not uncommon in most communities where students are learning to read via a second language; e.g., English language learners. In addition to the above issues, we also sought to examine the extent to which the SVR applies to L2 reading comprehension cross-linguistically (i.e., from English to French). This permits us to explore predictors of L2 reading comprehension, an aspect of L2 reading acquisition that has rarely been examined in the case of FI.

Method

Participants

The participating children were attending elementary schools in a region outside of greater Montreal. The geographical area served by these schools includes primarily francophone families, but there are numerous pockets of anglophone and bilingual (French and English) families as well. The socio-economic status of the children who attend these schools varies from low to high. According to our questionnaire results, the mean number of years of the children's mother's education was 13. These schools were selected because they have a relatively high proportion of monolingual English and English-dominant students. 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 English-dominant. Most parents who did not volunteer to participate in the study did so because their child did not qualify. Written consent was initially obtained for 90 K children from the immersion program, although 4 participants 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 children completed K and Grade 1 testing. These children were in 12 different classrooms in 7 different schools.

Based on information obtained from the children's parents via a questionnaire (see description of *Parent Questionnaire* below) and scores on standardized French (EVIP) and English (PPVT) receptive vocabulary tests administered to the children in the Fall of K (see description of *EVIP* and *PPVT* below), it was determined that 45 of the children were monolingual English (mean

EVIP standard score of 60, and mean PPVT standard score of 107) and 41 were English-dominant bilinguals (mean EVIP standard score of 87 and mean PPVT standard score of103). In the Fall of K, the children ranged in age from 4 years 9 months to 6 years with a mean age of 5 years 6 months.

Materials

Language, reading-related, and various control tests were administered to all children in the Fall of K (Time 1), in the Spring of K (Time 2), and in the Spring of Grade 1 (Time 3). In addition, a questionnaire was sent to all parents in the Fall of K. A brief description of each measure follows. The tests have been classified as language-related, reading-related, and control measures.

Language-related predictor measures. Oral language skills which were used as predictors were assessed using tasks that tap into vocabulary, grammar, and phonological memory.

English and French receptive vocabulary skills were assessed in the Fall of K and were entered into the regression analyses to control for differences in general English and French language proficiency at the beginning of schooling. The *Peabody Picture Vocabulary Test* – IIIA (PPVT-IIIA; Dunn & Dunn, 1997) was administered to assess English receptive vocabulary (nouns, verbs, and adjectives). 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 $r = .82$.

Receptive and expressive grammar in English was assessed using the Sentence Structure subtest of the *Clinical Evaluation of Language Fundamentals-*4 (CELF-4; Semel, Wiig, & Secord, 2003) and the *Test of Early Grammatical Impairment* (TEGI; Rice & Wexler, 2001). These tests were administered at Time 1, Time 2, and Time 3. The Sentence Structure subtest of the CELF-4 evaluates a child's comprehension of syntax. Sentences were read aloud to the child and he or she was asked to point to one picture among four that best corresponded to the spoken sentence (e.g., "The first two children are in line, but the third child is still playing."). CELF-4 subtest stability coefficients range from $r = .74$ to $r = .93$, as reported in the manual. The TEGI was administered to evaluate each child's morphological development (i.e., 3rd person *–s* and regular and irregular past tense). 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."). This test was designed to identify children at risk for oral language impairment. Stability coefficients ranging from $r = .82$ to $r = .95$ are reported in the TEGI manual for the expressive grammar probes.

A French adaptation of the Sentence Structure subtest of the CELF-4 was administered at Time 3 in order to test the SVR in French-L2. It was used to assess French listening comprehension and, of our measures, this is the test that most closely paralleled our reading comprehension measure.

Reading-related predictor measures. Reading-related skills that were used as predictors were tasks that tap into phonological processing and knowledge of the alphabetic principal.

Phonological processing was assessed using tasks that tap into 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). Inter-rater reliability was $r = .99$ (T1) and $r = .92$ (T2). The Spearman-Brown reliability was $r = .92$ (T1) and $r = .94$ (T2).

Phonological access was assessed at Times 1 and 2 by the ability to rapidly retrieve the names of visual symbols 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, a combination of letters and numbers, and a combination of letters, numbers and colours. Both alphanumeric (numbers) and non-alphanumeric (objects) subtests were included because there is evidence that alphanumeric naming may be more closely associated with decoding accuracy (e.g. Savage & Frederickson, 2005), while non-alphanumeric naming may be more closely associated with more general language deficits (e.g., Catts, Gillespie, Leonard, Kail, & Miller, 2002) or attention problems (e.g., Purvis & Tannock, 2000). 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 name the 5 numbers on this plate). As per directions in the test manual, errors produced during rapid automatized naming were not factored into the score so that a child who made many inconsistent errors (e.g., said "red" instead of "green") would obtain the same score as a child who did not make any errors, as long as the actual speed of naming all the items on a test plate was the same. Test-retest reliability ranged from $r = .81$ to $r = .98$ for this test, as reported in the manual.

The *Children's Test of Non-Word Repetition* (CNRep; Gathercole & Baddeley, 1996; original English version) was administered at Time 1 and Time 2 to assess phonological short-term memory. Each child was asked to repeat 40 pseudo-words presented via a tape recorder (e.g., "perplisteronk"). The child's renditions of each were later scored for accuracy. Sound substitutions and omissions were scored as errors. Inter-rater reliability was $r = .82$ (T1) and $r = .84$ (T2).

Letter-name knowledge in English was assessed at Times 2 and 3 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. Median test coefficient alphas ranged from $r = .82$ to .95.

Letter-name knowledge in French was assessed at Time 1 and Time 2 using a French adaptation of 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. Inter-rater reliability was *r* = .96 (T1) and *r* = .94 (Time 2). The Spearman-Brown reliability was *r* = .94 (T1) and *r* = .96 (T2).

Reading achievement measures. Decoding in French was assessed at Time 3 (Grade 1) using the *Wechsler Individual Achievement Test*-Second Edition: French-Canadian (WIAT-II^{CDN}; Wechsler, 2005; original French version). Only the Word and Pseudo-word identification subtests (*Lecture de mots* and *Décodage de pseudo-mots*) were administered, and only items that required decoding were administered (some items of the original WIAT- II^{CDN} word decoding subtest actually assess PA rather than decoding). Word identification involved the child reading a list of real words out loud, and pseudo-word identification involved reading pseudo-words out loud accurately and fluently. Reliability coefficients for the WIAT-II^{CDN} are reported to be *r* = .99 for word identification and *r* = .97 for pseudo-word identification.

We included pseudo-word decoding as an outcome measure in addition to word decoding because the former is not confounded with vocabulary knowledge and, thus, pseudo-word reading is a “pure” measure of decoding. It was our goal to examine whether the same predictors were related to these two forms of word reading. Pseudo-word decoding in English was assessed at Time 3 in order to test the SVR in French-L2. The Word Attack subtest of the *Woodcock-Johnson III Tests of Achievement* (WJACH-III; Woodcock, McGrew, & Mather, 2001) was used. Pseudo-word identification involved reading pseudo-words out loud accurately and fluently. Reliability coefficients for the WJACH-III are reported to be *r* = .94 for pseudo-word identification. Reading comprehension was assessed at Time 3 using the *Batterie d’échelles multidimensionnelles pour l’évaluation de la* *lecture* (BEMEL; Cormier, Desrochers, & Sénéchal, 2006), an experimental measure of literacy skills in French. Only the word comprehension and sentence comprehension subtests were administered. For word comprehension, each child read 30 single words, 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, one at a time, and pointed to the picture that was a match with the sentence from a set of four pictures. The Spearman-Brown reliability was r = .87 (words) and r = .87 (sentences).

Control Measures. The following control measures were administered at Time 1: (a) hearing screening, (b) vision screening, and (c) non-verbal cognitive ability.

Hearing screening was conducted at Time 1 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.

Vision screening was conducted using the *Rosenbaum Pocket Vision Screener* ©, a near vision visual acuity screener based on the Snellen eye chart. The child had to identify letters and numbers presented at a distance of 14 inches, one eye at a time (the eye not being tested was covered with an eye patch). To pass the vision screening, 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.

Non-verbal cognitive ability was assessed using the *Coloured Progressive Matrices* (CPM; Raven, Raven, & Court, 1998). The child was required to look at a visual pattern and determine which one of six individual pieces best completed the test pattern. Internal reliability is reported to range from r = 70 to r = .80.

Questionnaire. At Time 1, parents were asked to complete a questionnaire containing questions related to language background, family history, socio-economic status, and the child's health, developmental milestones, and exposure to reading and books.

Procedure

A battery of tests was administered to each child at Time 1 (October-November 2005), a second battery of tests was administered at Time 2 (April-May 2006), and a third was administered to each child at Time 3 (April-May 2007). At each testing time, the order of test administration was held constant across participants.

Testing conditions. Each session lasted between 20 and 45 minutes and each child was generally only seen once per day. French and English tests were not administered on the same day, except for some French control measures and English tests that were conducted on the same day because many children had very limited French skills at that time and 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.

Examiners. The research team was comprised of research assistants trained and supervised by an experienced and certified clinical speech-language pathologist (CE). Each child was seen by at least two, sometimes three, different examiners over the course of testing.

Results

Inspection of the Fall-K data (using the *descriptives* procedure of SPSS to generate *z* scores from raw scores) revealed that the following variables had skewed distributions and each contained between one and three outliers (> |3.0| SD): TEGI total (mean of TEGI 3rd person –s and TEGI past tense), English WRAT-3, and CPM. See Table 1 for the means and standard deviations of each measure from the Fall-K testing. Distributional normality was achieved by reversing the scores and applying a square root transformation (TEGI total), applying a square root transformation only (English WRAT-3), or applying a natural log transformation (CPM) (Altman, 1991). Even after these transformations were applied, one outlier remained among the CPM scores (z = + 3.11) and two among the English WRAT-3 scores (z = -3.37, z = -3.37). These were kept in the analyses. There was an elevated rate of zero scores for the English blending (cv, vc, and cvc) task suggesting that this test was too difficult for many of the children. We, therefore, recoded this variable into a binary categorical variable: children who were unable to blend at least one vc item were given a code of 1 and those who succeeded at blending at least one vc item were given a code of 2. It should be noted that only blending vc was entered into our regression analyses because preliminary regression analyses revealed that cv and cvc did not contribute significantly to the prediction of reading above and beyond the variance that vc contributed.

Inspection of the Spring-K data revealed that the TEGI total, the English WRAT, and the Objects subtest of English RAN/RAS had skewed distributions and contained between one and three outliers each. See Table 1 for the means and standard deviations of each measure in the Spring-K testing. Distributional normality was achieved by reversing the scores and applying a square root transformation (TEGI total), a natural log transformation (Objects subtest of English RAN/RAS), or a square root transformation only (English WRAT). Despite applying transformations where appropriate, one outlier remained among the TEGI total scores ($z = +3.62$) and the Objects subtest of the English RAN/RAS scores ($z = +3.84$). Again, there was an elevated rate of zero scores for the English blending tasks (though less so than in Fall K). As before, these results were recoded as a binary categorical variable. For the reasons stated above, blending vc was again the only blending subtest entered into the regression analyses.

Insert Table 1 about here

Step-wise regression analyses were carried out to identify significant predictors of Grade 1 L2 reading outcomes; separate analyses were run for word decoding, pseudo-word decoding, and reading comprehension. Separate analyses were also conducted using Fall- and Spring-K predictors in order to examine the differential predictive ability of Fall- versus Spring-K predictor scores. Thus, six regression analyses in total were conducted. With the exception of French and English receptive vocabulary, only predictor measures that were administered both in English and in French and both in Fall and Spring of K were included in the analyses. The same K predictor measures were used in all analyses: French receptive vocabulary (EVIP-A), English receptive vocabulary (PPVT-IIIA), English pseudo-word repetition (CNRep), English blending, English expressive morphology (TEGI total), English letter-name knowledge (WRAT-3), English word decoding (WRAT-3), and English rapid automatized naming of objects (RAN/RAS-Objects subtest). We included pseudo-word decoding as an outcome variable in addition to word decoding since the former is not confounded with vocabulary knowledge, and it was our goal to examine whether some variables are uniquely predictive of only one of these two partially overlapping outcome variables. Fall scores on the English and French receptive vocabulary tests were included as control measures in all analyses (whether Fall or Spring predictors were being analyzed) to control for initial levels of general proficiency in each language. *Z* scores were used in all analyses. Analyses were run using both transformed and non-transformed scores and since there were no differences in the overall amount of variance accounted for or in individual regression coefficients, statistical results using non-transformed scores are reported for ease of interpretation.

The results for word decoding, pseudo-word decoding, and reading comprehension are presented and discussed separately; as are the results using Fall-K and Spring-K predictors. Table 2 provides a summary of the simple correlations between the variables included in the regression analyses. Table 3 summarizes the results of the regression analyses.

Insert Table 2 and 3 about here

Grade 1 French Word Decoding

Fall-K predictors. The analysis revealed that scores on English letter-name knowledge (ß = .453, p = .000) and French receptive vocabulary (ß = .250, p = .011) were significant predictors of word decoding scores at the end of Grade 1. These two predictors accounted for almost one quarter of the variance in test scores (R^2 = .244); $F(2,82)$ = 13.216, p = .000.

Spring-K predictors. Results indicated that scores on English blending (ß = .516, p =.000), English word decoding (ß = .303, p = .000), and French receptive vocabulary (ß = .255, p = .002) were significant predictors of word decoding at the end of Grade 1. These three predictors accounted for almost half of the variance in test scores (R^2 = .480), which was highly significant $F(3,82)$ = 25.208, p = .000.

Grade 1 French Pseudo-word Decoding

The same predictor variables were entered in these analyses as were entered in the analyses of word decoding.

*Fall-K predictors.*The analysis revealed that scores on English letter-name knowledge (ß = .485, p = .000) and French receptive vocabulary (ß = .211, p = .030) were again the only significant predictors of pseudo-word decoding scores at the end of Grade 1. These two predictors accounted for about one quarter of the variance in test scores (R^2 = .258), which was highly significant, $F(2,82)$ = 14.238, p = .000.

Spring-K predictors. The analysis revealed that, similar to the Spring-K prediction of Grade 1 word decoding, English blending (ß = .503, p = .000) and English word decoding (ß = .262, p=.004) in the Spring of K, and French receptive vocabulary (ß = .213, p=.014) in the Fall of K were significant predictors of pseudo-word decoding one year later. These three predictors accounted for almost half of the variance in test scores (R^2 = .414), which was highly significant $F(3,82) = 19.307$, p = .000.

Grade 1 French Reading Comprehension

Fall-K predictors. The analysis revealed that scores on English letter-name knowledge (ß = .336, p = .001), French receptive vocabulary (ß = .339, p = .000), English blending (ß = .341, p = .000), and English rapid automatized naming of objects (ß = -.233, p = .006) at K entry were significant predictors of Grade 1 French reading comprehension scores. These four predictors accounted for over half of the variance in test scores (R^2 = .546), which was highly significant $F(4,80) = 24.062$, p = .000.

An additional analysis was run in which English rapid automatized naming of objects was replaced by English rapid automatized naming of numbers in order to determine whether the nature of the task (lexical versus numeric) specifically was the determining factor. The result was that French receptive vocabulary (ß = .372, p = .001), English blending (ß = .378 , p = .001), English rapid automatized naming of numbers (ß = -.411 , p = .000), and English receptive vocabulary (ß = .353 , p = .001) were the significant predictors of Grade 1 French reading comprehension. These four predictors accounted for almost half of the variance in test scores (R^2 = .464), which was highly significant $F(4,56) = 12.105$,

p = .000. These results suggest that there may be something specific to rapid automatized access to lexical information that plays a significant role in reading comprehension since rapid automatized naming emerged significant in both analyses, but English receptive vocabulary emerged only in the second analysis when rapid automatized naming of objects was replaced by rapid automatized naming of numbers; the latter is arguably less language loaded than the former.

Spring-K predictors. The analysis revealed that English blending (ß = .588, p = .000), French receptive vocabulary (ß = .339, p = .000), English letter-name knowledge (ß = .228, p = .001), and English rapid automatized naming of objects (ß = -.195, p = .005) were significant predictors of reading comprehension one year later. These four predictors accounted for over 65% of the variance in comprehension test scores (R^2 = .669), which was highly significant $F(4,81)$ = 41.014, p = .000.

When English rapid automatized naming of objects was replaced by English rapid automatized naming of numbers, the significant predictors of Grade 1 French reading comprehension were English blending (ß = .580, p = .000), French receptive vocabulary (ß = .375 , p = .000), English rapid automatized naming of numbers (ß = -.325 , p = .000), and English receptive vocabulary (ß = .211 , p = .003). These four predictors accounted for over 65% of the variance in test scores (R^2 = .673), which was highly significant $F(4,72)$ = 37.031, p = .000. These results narrowly paralleled those of the analogous Fall-K analysis.

For all regression analyses described above, it is noteworthy that the results remained identical when both age and non-verbal cognitive ability were added (step-wise) to the list of predictors or forced in before entering the other predictor variables. In addition, controlling for decoding ability in Fall and Spring K (i.e., forcing in word decoding ability before entering the other predictor variables step-wise in each linear regression analysis) also revealed very similar results, but in addition, the total variance accounted for was a few percentage points higher for every analysis and at each time point.

The Simple View of Reading Applied to L2 Reading Acquisition

In the following analyses, we sought to examine whether the SVR is applicable to learning to read in an L2. It will be recalled that, according to the SVR, reading comprehension is equal to the product of decoding and listening comprehension, measured concurrently with comprehension. Thus, we wanted to determine whether L2 oral language predictors played a significant unique role in predicting the L2 reading comprehension outcomes beyond that played by L2 literacy variables (i.e., decoding). If the answer is “yes”, then we also wanted to determine whether the relationship between the oral language and literacy variables that best predicts L2 reading comprehension is additive or multiplicative. See Table 2 for simple correlations between these variables and Table 4 for a summary of regression analyses results.

Insert Table 4 about here

Step-wise regression analyses were carried out using Grade 1 French listening comprehension (French CELF-Sentence Structure), Grade 1 French pseudo-word decoding, and both the sum and the product of Grade 1 French listening comprehension and Grade 1 French pseudo-word decoding as predictors.

Grade 1 French reading comprehension scores (mean of the sum of French word reading comprehension and French sentence reading comprehension *z* scores) were entered as the outcome variable. The regression revealed that, above and beyond the highly significant contribution of the Grade 1 French pseudo-word decoding score (ß = .725, $p = .000$), the product of the Grade 1 French pseudo-word decoding and Grade 1 French listening comprehension scores was a significant (ß = -.262, $p = .001$) predictor of French reading comprehension. Together, Grade 1 French pseudo-word decoding and the product of the Grade 1 French pseudo-word decoding and Grade 1 French listening comprehension scores accounted for over half of the variance in concurrent French reading comprehension test scores ($R^2 = .553$), which was highly significant $F(2,83) = 51.364$, $p = .000$. When the analyses were conducted using word decoding instead of pseudo-word decoding, the product of Grade 1 French word decoding and Grade 1 French listening comprehension was again a significant predictor (ß = -.190, $p = .017$) of French reading comprehension, above and beyond the highly significant contribution of the Grade 1 French word decoding (ß = .742, $p = .000$), and the total amount of variance accounted for increased to 60% ($R^2 = .600$), indicating that word decoding is a better predictor of reading comprehension than pseudo-word decoding.

The regression analyses were run a second time replacing French predictor measures with their English language equivalents in order to determine whether it was possible to concurrently predict French-L2 reading comprehension ability using English-L1 decoding and listening comprehension scores. More specifically, French WIAT-Pseudo-word decoding subtest scores and French

CELF-Sentence Structure subtest scores were replaced with Grade 1 English Word Attack subtest scores from the WJACH-III and the English CELF-Sentence Structure subtest scores, respectively. Only pseudo-word decoding in English emerged as a significant concurrent predictor of French reading comprehension (ß = .533, p = .000), and the amount of variance accounted for decreased to 28% (R^2 = .284), which was significant $F(1,84) = 33.393$, $p < .001$). However, these results suggest that the SVR does not apply cross-linguistically.

Discussion

The goals of the present study were to examine (1) the extent to which predictor measures of decoding and reading comprehension in monolingual English speakers would predict decoding and reading comprehension skills in English-speaking students who are learning to read in French in an early immersion program; (2) how early in K significant cross-linguistic predictions would emerge -- Fall or Spring of K; (3) whether oral language skills in French contribute significantly to predictions of variability in L2 reading outcomes; and (4) the generalizability of the SVR to reading comprehension in a second language, both cross-linguistically and intra-linguistically.

Letter-sound knowledge in English and blending in English were found to be significant K predictors of word decoding in French at the end of Grade 1. Similar results attesting to the importance of knowledge of the alphabetic principle and PA in learning to read have been well documented in both L1 and L2 reading research (August & Shanahan, 2006; Comeau et al., 1999; Genesee et al., 2006; NICHD, 2000). We found that the same K variables were also significant predictors of pseudo-word decoding in Grade 1. That the same predictors emerged for word and pseudo-word reading is probably due to the fact that these Grade 1 immersion students were only beginning to read and, therefore, most printed words were unfamiliar and essentially equivalent to pseudo-words to them, rendering it unnecessary to call on a separate set of skills. In any case, these results indicate that letter-sound knowledge and blending are core decoding skills since they are implicated in reading words that the students have never seen before ("pseudowords") as well as real words.

Letter-name knowledge in English was a significant Fall-K predictor whereas blending in English was a significant Spring-K predictor, possibly owing to the greater ease that young children have in learning letter names as compared to blending sounds (see also Uhry & Clark, 2005, for a similar point of view). Moreover, the students may not have acquired blending skills sufficiently in the Fall of K for there to be sufficient variance to predict later reading outcomes. Research has suggested that there may be a reciprocal relationship between PA and exposure to reading instruction (Castles & Coltheart, 2004; Hogan, Catts, & Little, 2005; Perfetti, Beck, Bell, & Hughes, 1987) and, thus, PA may not be as sensitive a predictor of word decoding in a second language as letter-sound knowledge when working with beginning level K immersion students. However, by the end of K, children in our study had had some formal literacy instruction and, arguably, had acquired more PA and, in particular, blending skills, at this stage.

Contrary to the findings of Jared et al. (2006), we found that knowledge of French, as measured by a receptive vocabulary test at school entry, was an additional significant predictor of decoding outcomes in Grade 1, bringing the total variance accounted for to 24% (word) and 26% (pseudo-word) in the case of Fall of K and 48% (word) and 41% (pseudoword), respectively, in the case of Spring of K. That knowledge of French was a significant predictor of French-L2 decoding outcomes in the present study, but not in Jared and her colleagues' study, may not be surprising considering the relative proportion of individuals who speak French in Quebec (95%) and thus the greater variability in our participants' exposure to French in comparison to the situation in New Brunswick (10.58%) and Ontario (11.86%), the site of Jared's study (Statistics Canada, 2006). These results differ from those reported in studies of L1 reading acquisition where it has been found that, when regression analyses have been used to remove variance due to age, IQ, PA, and knowledge of the alphabetic principal, vocabulary is not a significant predictor of L1 decoding abilities (Byrne & Fielding-Barnsley, 1993; McGuinness, 2005). This discrepancy may be due to the fact that most students in the L1 studies had acquired the requisite minimum vocabulary that underpins early reading acquisition in an L1, and there was insufficient variation in their vocabulary to account for variation in decoding. That receptive vocabulary emerged as a significant predictor in the present study suggests that oral language development, and especially oral vocabulary, is uniquely important for learning to read in a second language. Indeed, the National Literacy Panel on Language-Minority Children and Youth (August & Shanahan, 2006) arrived at a similar conclusion; namely, that although oral language does not contribute to decoding as strongly as phonological processing, its role is nonetheless an important one. By implication, systematic and direct vocabulary instruction is probably an important component of an early L2 reading instruction program.

With respect to reading comprehension, rapid automatized naming of objects in English along with letter-sound knowledge in English, English-blending, and French receptive vocabulary at K entry contributed significantly to the prediction of L2 reading comprehension at the end of Grade 1. Overall, the Fall and Spring predictor tests predicted 52% and 65%, respectively, of the variance in reading comprehension in the Spring of Grade 1. Interestingly, when rapid automatized naming of objects was replaced with rapid automatized naming of numbers, English receptive vocabulary in Fall K emerged as a unique and significant predictor along with blending, knowledge of French at K entry, and RAN/RAS-Numbers. That English receptive vocabulary became a significant predictor when rapid automatized naming of familiar non-alphanumeric stimuli was replaced with rapid automatized naming of familiar alphanumeric stimuli suggests that there is a unique and significant role played by a semantic component, in addition to the role played by speed of access to familiar phonological information per se, in predicting reading comprehension. This suggests that non-alphanumeric rapid automatized naming may be tapping into oral language ability specifically. Indeed, while rapid automatized naming has been found to correlate with reading in numerous studies, most studies have involved alphanumeric rapid automatized naming or a combination of alphanumeric (e.g., numbers, letters) and non-alphanumeric (e.g., objects, colours) rapid automatized naming. Furthermore, there is evidence to suggest that alphanumeric rapid automatized naming correlates more closely with decoding than non-alphanumeric rapid automatized naming (Schatschneider, Carlson, Francis, Foorman, & Fletcher, 2002; van den Bos, Zijlstra, & Spelberg, 2002; Wolf, 1986; but not Meyer, Wood, Hart, & Felton, 1998). That a test that is linked specifically to L1 oral language ability uniquely and significantly contributes to the prediction of L2 reading comprehension, but not to the prediction of L2 decoding, makes sense within a component processes framework of reading, such as the SVR (Gough & Tunmer, 1986), a point we return to shortly. These results are consistent with Jared et al.'s (2010) insofar as they found that predictions of L2 decoding and reading comprehension differed in precisely the same manner -- grammatical ability, an oral language task, was uniquely predictive of reading comprehension but not decoding.

As stated above, 22%, 24%, and 52% of the variance in Grade 1 French word decoding, pseudo-word decoding, and reading comprehension, respectively, was predicted on the basis of the Fall-K predictors. This suggests that it is possible to identify risk for difficulty in L2 reading development in immersion students as early as the beginning of K using L1 predictor measures; this is especially evident from the reading comprehension results where 52% of the variance was predicted. It follows, then, that important early intervention opportunities will be missed if it is assumed that the identification of immersion students who may be at risk for reading difficulties should be delayed until they have acquired competence in oral French. At the same time, the predictive power of the K predictor variables examined increased substantially from Fall to Spring and, more specifically, from 23% to 46% for word decoding; from 24% to 39% for pseudo-word decoding; and from 52% to 65% for reading comprehension.

This suggests that immersion students should be reassessed periodically to monitor their progress and risk status as instruction continues during K.

It is noteworthy that it was possible to predict almost twice as much variance in the Grade 1 reading comprehension scores in comparison to the Grade 1 decoding scores. To be more specific, using the Fall-K predictors, about 25% of variance in Grade 1 word decoding was predicted while over 50% of the variance in Grade 1 reading comprehension scores was predicted. We are continuing to monitor these students reading acquisition in Grades 2 and 3 to ascertain if these levels of prediction hold up. If the variance in reading comprehension outcomes in higher grades can be predicted to the same extent using K predictors as found by the end of Grade 1, this would reinforce the feasibility of early identification, even as early as Fall of K.

A second goal of this study was to examine whether Gough and Tunmer’s (1986) SVR is applicable to learning to read in a second language and whether it can be applied cross-linguistically. That is, whether L1 components predict L2 outcomes as predicted by the SVR. Linear regression was used to examine this question. Specifically, we entered L2 listening comprehension, L2 pseudo-word decoding, the sum of these two, and the product of these two step-wise and found that both L2 pseudo-word decoding and the product of L2 listening comprehension and L2 pseudo-word decoding contributed significantly to the prediction of Grade 1 L2 reading comprehension; together they accounted for 54% of the variance in French reading comprehension. That the product of listening comprehension and decoding significantly contributed to the prediction, above and beyond the sum of these, indicates that there is indeed an interaction or multiplicative relationship between these two variables in relation to reading comprehension in a second language. However, we found no evidence that the SVR applies cross-linguistically, that is, using L1 predictors to predict L2 reading outcomes. The latter may be due to the fact that these immersion students probably had disproportionately strong English-L1 listening comprehension skills as compared to their English decoding skills, keeping in mind that these children have not received L1 decoding instruction. As result, the product of their English listening comprehension and decoding skills would have been very low and insufficient to predict their relatively strong French reading comprehension skills (i.e., predictors of the equation would carry too much weight in the case of both an additive and a multiplicative relationship). In any case, the present results, along with those reported by Chen and Vellutino (1997), Kirby and Savage (2008), Savage (2006), and Savage and Wolforth (2007), suggest that the multiplicative relationship between comprehension and decoding that the SVR hypothesizes plays a critical role in reading comprehension and applies intra-linguistically. Be it in a first language or in a second language, it does not apply cross-linguistically. These results are best regarded as preliminary insofar as our participants were at the early stages of acquiring reading comprehension skills in French. Follow-up testing, when the students are in Grade 2 and higher, will provide important cross-validation of these findings.

Evidence that the SVR applies to learning to read in an L2 is important because this constitutes the first evidence that we know of concerning individual differences in reading comprehension among immersion students who learn to read initially in French. These results also contribute to our understanding of the predictors of reading comprehension skills in a second language in general, which at present is limited because the data-base on L2 reading comprehension is so sparse (August & Shanahan, 2006). Practically speaking, the present results argue for an integrated approach to reading instruction in which listening comprehension and general oral language skills along with decoding skills are part of a comprehensive program of reading instruction for second language learners.

In conclusion, we have reported evidence for a significant role for L1 reading-related and language-related abilities in the acquisition of reading skills in French as a second language. These results corroborate other short-term studies of L2 reading acquisition in FI students (Bournot-Trites & Denizot, 2005; Comeau et al., 1999; Deacon et al., 2007; Geva & Clifton, 1994; Jared et al., 2010; MacCoubrey et al., 2004; Tingley et al., 2004; also, see Genesee & Jared, 2008, for a review) and English language learners (August & Shanahan, 2006; Genesee et al., 2006). There is good evidence from these results to justify early identification of FI students who might be at risk for later reading difficulties. Identification as early as Fall of K is possible since the present evidence indicates that assessments of L1-related skills and knowledge in the Fall of K are significant predictors of later L2 reading outcomes and of comprehension outcomes in particular. Our results with respect to comprehension, although preliminary, constitute the first examination of individual differences in the L2 reading comprehension skills of immersion students and are an important first step toward developing a coherent and integrated approach to L2 reading instruction with a scientific basis. The present results also argue for additional support for immersion students who are at risk for difficulty acquiring reading skills in French that emphasize the same kinds of skills as are called for in L1 readers with difficulty; namely, letter-sound knowledge and PA. The present results suggest that immersion students who are at risk also need support in their oral language development and particularly vocabulary in the early stages and listening comprehension later.

This study has limitations, of course, not the least of which is the fact that 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 provide sufficient justification for a follow-up study that involves intervention, which would serve to both validate the present findings and establish a causal link between our predictor variables and outcome measures. A second limitation is our relatively small sample size and the obvious statistical constraints that is associated with this. A useful adjunct to this study would be a control group of English-speaking students receiving instruction in English with whom we could confirm and validate our findings. While we have been recruiting such a control group, recruitment is ongoing due to a relatively much smaller proportion of children meeting our recruitment criteria (namely, being English dominant) who attend English-L1 programs in Quebec.

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Table 1

Means and Standard Deviations of 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 in months	86	59	73	67	4										
IQ	86	11	36	18	4										
Rec. voc. (F)	86	1	94	29	19										
Rec. voc. (E)	86	46	115	81	15										
Blending	86	0	9	3	3	86	0	9	5	4					
RAN-o (E)	85	38	120	71	17	86	40	124	68	16					
RAN-n (E)	61	33	169	64	22	77	28	154	63	23					
Pwd rep. (E)	86	2	34	18	6	86	3	27	15	6					
Lnk (E)	86	0	15	10	4	86	3	15	12	4					
Word dec. (E)	86	0	16	1	2	86	0	15	1	2					
Exp. mor. (E)	86	6	100	83	19	86	5	100	88	15	86	0	100	91	13
Word dec. (F)											86	0	70	26	19
Pwd dec. (E)											86	2	26	7	5
Pwd dec. (F)											86	0	53	18	14
Word rdg comp. (F)											86	6	30	20	6
Sentence rdg comp. (F)											86	4	28	21	6
List. comp. (E)											86	18	26	24	2
List. comp. (F)											86	10	26	21	3

Note. Pwd = pseudo-word; dec. = decoding; rdg = reading; comp. = comprehension; F = French; E = English; rec. = receptive; exp. = expressive; voc. = vocabulary; rep. = repetition; mor. = morphology; Lnk = letter-name knowledge; RAN-o = rapid automatized naming-objects; RAN-n = rapid automatized naming-numbers; list. = listening.

Table 2

Bivariate Pearson Correlation Coefficients of Variables Included in Regression Analyses.

K to Grade 1

	1	2	3	4	5	6	7	8	9	10	11	12
1. K Rec. voc. (F)		-0.150	0.247	-0.107	-0.157	-0.099	-0.054	-0.067	-0.036	0.212	0.171	0.290[b]
2. K Rec. voc. (E)	-0.150		0.254	0.206	0.452[b]	0.274	0.160	-0.403[b]	0.032	0.131	0.157	0.222
3. K Pwd rep. (E)	0.223[a]	0.237[a]		0.238	0.326[b]	0.292[b]	0.365[b]	-0.395[b]	-0.320	0.299[b]	0.267	0.380[b]
4. K Blending (E)	-0.100	0.193	0.070		0.244	0.459[b]	0.218	-0.130	0.081	0.320[b]	0.331[b]	0.496[b]
5. K Exp. mor. (E)	0.046	0.369[b]	0.225[a]	0.257[a]		0.375[b]	0.154	-0.375[b]	-0.132	0.166	0.144	0.205
6. K Lnk (E)	-0.002	0.117	0.092	0.339[b]	0.282[b]		0.250	-0.413[b]	-0.423[b]	0.433[b]	0.468[b]	0.554[b]
7. K Word dec. (E)	0.019	0.094	0.168	0.451[b]	0.142	0.262[a]		-0.236	-0.278	0.247	0.236	0.239
8. K RAN-o (E)	-0.034	-0.232[a]	-0.275[a]	-0.381[b]	-0.183	-0.240[a]	-0.364[b]		0.557[b]	-0.317[b]	-0.311[b]	-0.439[b]
9. K RAN-n (E)	-0.143	0.005	-0.272[a]	-0.276[a]	-0.018	-0.194	-0.332[b]	0.530[b]		-0.358[b]	-0.267	-0.383[b]
10. Gr 1 Word dec. (F)	0.212[a]	0.131	0.205	0.504[b]	0.145	0.317[b]	0.437[b]	-0.372[b]	-0.424[b]		0.827[b]	0.756[b]
11. Gr 1 Pwd dec. (F)	0.171	0.157	0.242[a]	0.484[b]	0.223[a]	0.353[b]	0.391[b]	-0.371[b]	-0.400[b]	0.827[b]		0.697[b]
12. Gr 1 Rdg (F)	0.290[b]	0.222[a]	0.289[b]	0.556[b]	0.190	0.438[b]	0.354[b]	-0.404[b]	-0.469[b]	0.756[b]	0.697[b]	

Spring of Grade 1: Concurrent

	13	14	15	16	17	18
13. List. comp. (F)		0.319[b]	0.478[b]	0.208	0.812[b]	-0.318[b]
14. Pwd dec. (F)			0.135	0.723[b]	0.812[b]	0.110
15. List. comp. (E)				0.104	0.378[b]	-0.269[a]
16. Pwd dec. (E)					0.573[b]	0.018
17. Sum of 1 & 2 (F)						-0.128
18. Product of 1 & 2 (F)						

Note. [a] $p < .05$, [b] $p < .01$ (two-tailed); values above the diagonal represent Fall of K to Spring of Grade 1 Pearson correlation coefficients; values below the diagonal represent Spring of K to Spring of Grade 1 correlations; word = word decoding; pwd = pseudo-word decoding; rdg = reading comprehension; F = French; E = English; rec. = receptive; exp. = expressive; voc. = vocabulary; rep. = repetition; mor. = morphology; Lnk = letter-name knowledge; RAN-o = rapid automatized naming-objects; RAN-n = rapid automatized naming-numbers; Gr = Grade; list. comp. = listening comprehension.

Table 3

Summary of Linear Regression Analyses including K Variables as Predictors of L2 Decoding and Reading Comprehension Outcomes in the Spring of Grade 1.

	Fall K to Spring Gr 1						Spring K to Spring Gr 1					
	Word		Pwd		Rdg Comp		Word		Pwd		Rdg Comp	
	Beta	t	Beta	t	Beta	t	Beta	t	Beta	t	Beta	t
K Predictor												
Rec. voc. (F)	.250	2.589[b]	.211	2.208[a]	.339	4.429[c]	.255	3.184[b]	.213	2.505[b]	.339	5.278[c]
					(.372)	(3.586[c])					(.375)	(5.369[c])
Rec. voc. (E)	.064	.634	.078	.775	.051	.600	.063	.773	.090	1.044	.120	1.822
					(.353)	(3.443[c])					(.211)	(3.056[b])
Pwd rep. (E)	.118	1.131	.080	.770	.029	.329	.006	.068	.068	.756	.039	.561
					(.081)	(.696)					(.004)	
Blending (E)	.166	1.551	.156	1.470	.341	4.011[c]	.516	6.247[c]	.503	5.729[c]	.588	8.639[c]
					(.378)	(3.690[c])					(.580)	(8.302[c])
Exp. mor. (E)	.037	.353	-.010	-.100	-.055	-.640	.073	.899	.060	.693	.069	1.022
					(.031)	(.264)					(.045)	
Lnk (E)	.453	4.695[c]	.485	5.068[c]	.336	3.625[c]	.107	1.272	.165	1.857	.228	3.371[c]
					(.185)	(1.432)					(.089)	
Word dec. (E)	.156	1.591	.134	1.369	.050	.528	.303	3.582[c]	.262	2.994[b]	.086	1.217
					(.055)	(.518)					(.094)	
RAN-o. (E)	-.138	-1.305	-.118	-1.120	-.233	-2.795[b]	-.152	-1.778	-.175	-1.926	-.195	-2.908[b]
(RAN-n. [E])					(-.411)	(-4.187[c])					(-.325)	(-4.695[c])
Adjusted R^2	.225		.240		.523		.461		.393		.653	
					(.425)						(.655)	

Note. [a] $p < .05$, [b] $p < .01$, [c] $p \leq .001$; word = word decoding; pwd = pseudo-word decoding; rdg comp = reading comprehension; Beta = standardized Beta; F = French; E = English; rec. = receptive; exp. = expressive; voc. = vocabulary; rep. = repetition, mor. = morphology; Lnk = letter-name knowledge; RAN-o = rapid automatized naming-objects; RAN-n = rapid automatized naming-numbers; numbers in parentheses refer to values obtained when RAN-ob. is replaced with RAN-num.

Table 4

Summary of Linear Regression Analyses for Simple View of Reading Components Predicting L2

Reading Comprehension Outcomes in the Spring of Grade 1.

Grade 1 French Predictor Variable	Beta	t
Listening comprehension assessed via: French adaptation of CELF-4: Sentence Structure	.102 (.009)	1.223 (.099)
Pseudo-word decoding assessed via: WIAT-II CDN: Pseudoword decoding	.725 (.771)	9.826[c] (11.059)[c]
Listening comprehension + pseudo-word decoding	.165 (.015)	1.223 (.099)
Listening comprehension X pseudo-word decoding	-.262 (-.170)	-3.547[c] (-2.436)[a]
Adjusted R^2	.542 (.590)	
Grade 1 English Predictor Variable		
Listening comprehension assessed via: CELF-4 : Sentence Structure	.097	1.047
Pseudo-word decoding assessed via: WJACH-III: Word Attack	.533	5.779[c]
Listening comprehension + pseudo-word decoding	.144	1.047
Listening comprehension X pseudo-word decoding	.032	.338
Adjusted R^2	.276	

Note. [a] $p < .05$, [b] $p < .01$, [c] $p \leq .001$; Beta = standardized Beta; numbers in parentheses refer to values obtained when pseudo-word decoding is replaced with word decoding.

Connecting Text -- Study 1 to Study 2

Study 1 investigated the decoding and reading comprehension outcomes in French of a non-selected sample of monolingual English or English-dominant students who were being schooled in French; the sample included both typically-developing students and students at risk for reading and/or oral language difficulties and possibly impairment. The goal of this study was to determine the extent to which these students' achievement in reading in French as a second language (L2), both decoding and comprehension, could be explained by variables related to first language (L1) competence. Consistent with a wealth of L1 research, the findings from Study 1, using regression analyses, were that knowledge of the alphabetic principle in English and phonological awareness in English, both assessed in Kindergarten (K) were significant predictors of decoding ability in French at the end of Grade 1; knowledge of French in K, assessed using a test of receptive vocabulary, was also a significant predictor of decoding skills. Oral language ability in English, their native language, in addition to the latter variables, were found to be significant predictors of reading comprehension in French, suggesting that individual differences in L2 decoding and reading comprehension abilities can be differentially predicted.

The goal of Study 2 was to identify to what extent L1 predictor variables administered in K, when these children's French language skills were relatively undeveloped, could identify children who were at risk of eventually presenting with oral language and/or reading difficulties in French, their L2. In order to do this, we divided the sample of children from Study 1 into three groups: children who were performing below the typical range on a decoding task in French; children performing below the typical range on oral language tasks in French; and children performing below the typical range on both decoding and oral language tasks. The remaining children comprised the not-at-risk groups. We then ran discriminant analyses to determine which predictor measures, administered in L1 in K, best predicted whether children were at risk or not at risk for reading and/or language learning difficulties. Thus, Study 2 differed from Study 1 in that it examined oral language abilities in French-L2 in addition to reading achievement, and it focused on at-risk children rather than individual differences among children who were performing within the full range of performance, from low to high, in each domain – reading and oral language development. The specific questions addressed in Study 2 were: Are L2 oral language and reading difficulty distinct? And, Is it possible to accurately predict students who are at risk for oral language and/or reading difficulty using L1 predictors early in the students' schooling where their L2 proficiency was still limited?

Study 2

Predicting Risk for Oral and Written Language Learning Difficulties in Students Educated in a Second Language [4]

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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 during the elementary school years (Obadia & Thériault, 1997; Snowling, 2000). 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 (see Genesee, 2004, for a more detailed description of immersion programs). While the students in the current study spoke the majority language of the broader community in which they were living (viz. Canada), education through a second language 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). Reading impairment is estimated to affect between 5% and 20% of school age children (Miles, 2004; Shaywitz, 1998; Shaywitz, 2003) and 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; but see Rutter, Caspi, Fergusson, Horwood, Goodman, Maughan, et al., 2004). Poor reading comprehension and reduced vocabulary and background knowledge are generally thought to be secondary consequences of dyslexia (Gough & Tunmer, 1986; International Dyslexia Association, 2007; Padget, 1998; Stanovich, 1986).

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; for reviews, see also National Institute for Literacy, 2008, and NICHD, 2000). 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 (e.g., Wagner, Torgesen, Rashotte, Hecht, Barker, & Burgess et al., 1997; for a review see also National Institute for Literacy, 2008). The 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, 1996, 1999; Gough & Tunmer, 1986; 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, supports the view that phonological processing skills and letter knowledge are initially strong predictors of reading comprehension, presumably as a result of their importance for decoding when reading relatively simple text, but that oral language abilities play a stronger role by Grade 3 when comprehension is dependent on 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; Stothard & Hulme, 1995; 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; Verhoeven, 2007; for reviews, see also August & Shanahan, 2006, and Genesee & Jared, 2008). 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; that is to say, 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, 2010; 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; Royer & Carlo, 1991). In addition, and as has been found for reading comprehension in English-L1 students, reading comprehension in English-L2 students also 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, 2000); 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., French 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; Tallal, Ross, & Curtiss, 1989). On the basis of evidence that children with PLI are four times more likely than other children to have a relative with PLI (Stromswold, 1998) and that there is a higher rate of heritability of PLI in monozygotic than in dizygotic twins (Bishop, Adams, & Norbury 2006; Viding et al. 2003), PLI is thought to be genetically based. Children with PLI typically do not outgrow this condition, though they may go through periods where they appear to have done so either because diagnostic tests are not sensitive to complex language skills of older affected individuals (for example, figurative language), or the child is too young to have acquired abilities included in the diagnostic test, such as discourse-related skills (Nippold & Schwarz, 2002; cf. Scarborough & Dobrich's 1990 hypothesis of "illusory recovery").

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., Rice, Wexler, & Cleave, 1995; 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; Bedore & Leonard 1998; Goffman & Leonard, 2000; Rice, 1999; Rice et al. 1995), especially among English-speaking children. In fact, the specific morpho-syntactic 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 agreement verb 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). A test of expressive morphosyntax is one that is designed to elicit production of morphological or syntactic elements, for example the third person present tense marker in English (-s, as in "he sleeps).

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 our predictor variables, that is, the proportion of children correctly identified as being at-risk (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 L2 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 (Bedore & Pena, 2008; Damico, Oller, & Storey, 1983; Paradis et al., 2003; Restrepo, 1998).

Distinctiveness of Dyslexia and PLI

Evidence indicates that intervention for students 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; 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, the goal of the present study (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, as a group, 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, arguing 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). Using factor analysis of all participants' language scores at age 7, they found 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. Rather, 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 specific significant difficulties. Some researchers further suggest that within specific risk groups, predictors take on different levels of significance; 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, in particular, 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. Referring to the below average performance of these students as “difficulty” avoids this problem. They, nevertheless, can be considered *at risk* for impairment, either 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 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. 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 different classrooms in 7 different schools.

The children whose parents responded to our request 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.

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 predictive accuracy of predictions 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. More specifically, there were time constraints on how much testing of individual children was possible and, thus, tests that could be administered easily and relatively quickly were chosen. 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 5 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.

Control measures. The following control measures were administered 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.

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.

Non-verbal cognitive ability was assessed using the *Coloured Progressive Matrices* (CPM; Raven, Raven, & Court, 1998). The 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 $r = .80$.

Language-related predictor tests. Oral language skills which were used as predictors were assessed using tasks of vocabulary, grammar, and sentence repetition. These tasks were selected, in part, because previous research has shown them to be correlated with language impairment in English as a first language, as previously reviewed. 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. 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.

Expressive grammar in English was assessed using the *Test of Early Grammatical Impairment* (TEGI; Rice & Wexler, 2001). Two subtests of the TEGI were administered to evaluate verbal morphology: 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). 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.”). 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). Inter-rater reliability was r = .99 (T1) and r = .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 was included in our analyses. 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 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. 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 *r* = .96 (T1) and *r* = .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. 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 and fluently. 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, 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, one at a time, and pointed to the picture that matched the sentence from a set of four pictures. 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. 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. The child is 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 5 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, and each child was generally seen only once per day. 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 6 for the means and standard deviations of each test in Fall K. Distributional normality was achieved by reversing the scores and applying: a square root transformation (TEGI total), a square root transformation only (English WRAT-3), or 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 6 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 6 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, 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 7 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: $\chi^2 = 192.744$, 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 7 for results of the Spring-K PCA.

Insert Table 7 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 8 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 and the not-at-risk subgroup was comprised of 77 children.

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 8, 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 8, 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 8, 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 8, 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 8, 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 8, 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 and 73 in the English not-at-risk group; 6 children were at risk in L1 oral language only and 7 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 8, 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 8, column 8.

Insert Table 8 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 the 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. (2010) 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.

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Table 5

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 6

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 7

Results of Principal Components Analyses.

	Fall K		Spring K	
	Lit	Lang	Lit	Lang
Bldg VC	<u>0.75</u>	0.09	<u>0.70</u>	0.12
Ltr names	<u>0.72</u>	0.33	<u>0.71</u>	0.07
Wd dec	<u>0.61</u>	0.08	<u>0.61</u>	0.06
RAN-o	-0.17	<u>-0.71</u>	-0.52	-0.31
RS	0.43	<u>0.63</u>	0.26	<u>0.79</u>
Exp Morph	0.20	<u>0.76</u>	0.13	<u>0.82</u>
L-S	<u>0.81</u>	0.34	<u>0.86</u>	0.19
Rec Voc	0.09	<u>0.78</u>	0.06	<u>0.83</u>
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 8

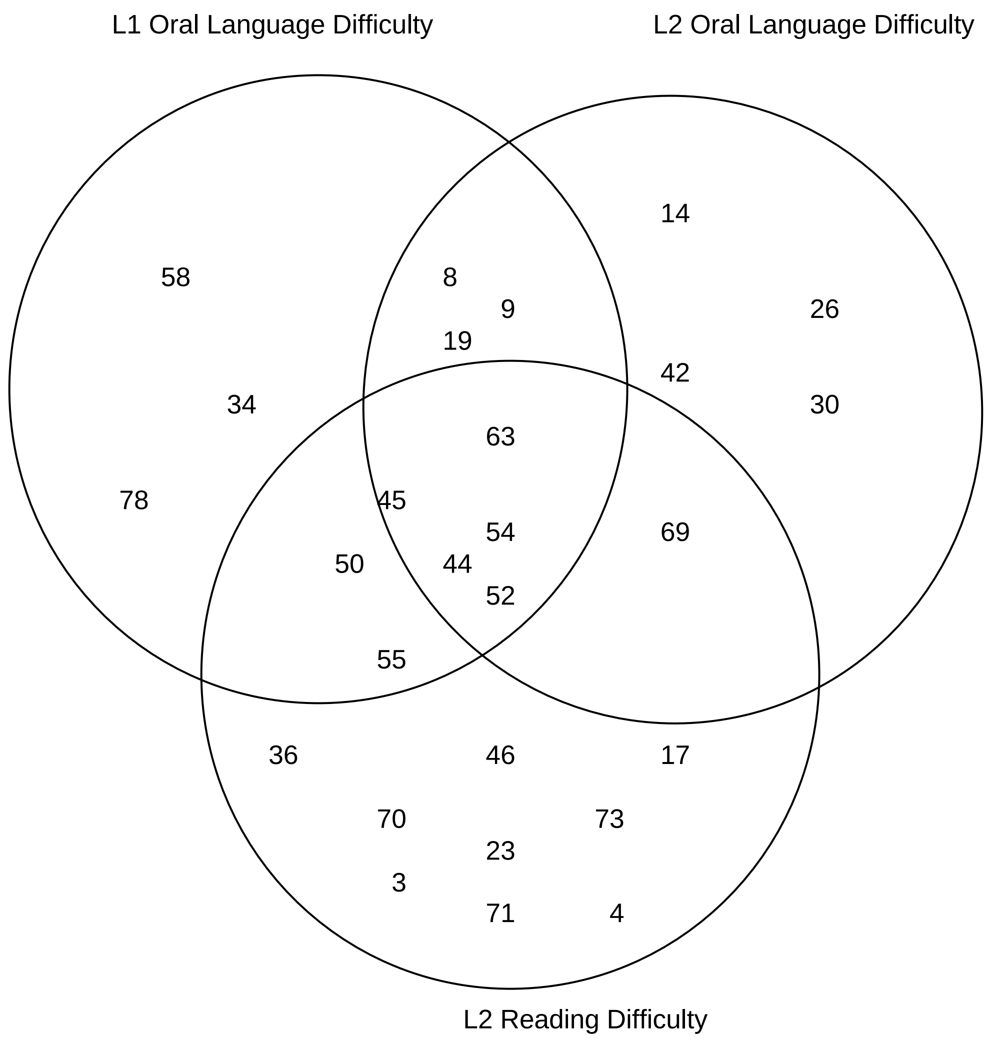
Results of Discriminant Analyses on Prediction of French Grade 1 Outcomes from English K Predictors.

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
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63
78
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44
52
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36
46
17
70
73
23
3
71
4
L2 Reading Difficulty

General Discussion

Immersion programs were first introduced in Canada in1965 in response to English-speaking parents' desires to improve their children's learning of French as a second language (L2) in school. Since their inception, numerous studies have documented the success of these programs. In brief, research has consistently shown that they promote the acquisition of advanced levels of French proficiency and, at the same time, native language and academic achievement that is generally as high as, or in some cases superior to, that of students attending English programs (e.g., Genesee, 1987, 2004; Lambert & Tucker, 1972; Swain & Lapkin, 1982); these results have been reported even for students who have intellectual, cultural, or socio-economic disadvantages (Genesee, 1976, 2007; Holobow, Genesee, & Lambert, 1991). In contrast, there is very little research that has examined individual differences in reading and oral language development of immersion students and, more specifically, risk for reading and oral language development in immersion students. This gap in research is striking in light of the documented high rate of attrition from these programs owing, at least in part, to reading and oral language difficulties (Halsall, 1994; Parkin, Morrison, & Watkin, 1987). Children with learning difficulties are often counselled out of immersion programs and little effort is made to understand if this is indeed the best decision, thus rendering this practice ethically questionable.

The studies presented in this dissertation were undertaken to fill these gaps. More specifically, they investigated individual differences in and risk for reading and oral language development of anglophone children who were being educated in French L2 immersion (FI) programs in the greater Montreal region. Although conducted in Canada, and in particular in the province of Quebec, the research presented here can be conceptualized more broadly to represent children who are educated in a L2 in other sociolinguistic contexts, including children from minority language backgrounds in the United States, for example. While it is an empirical question whether the present results with immersion students in Canada would generalize to minority language L2 learners in Canada or elsewhere, there is reason to believe that they would, a point that that is discussed later. Certainly the issues addressed in these studies are relevant to discussions of at-risk L2 students educated in other contexts. Whether they are working with minority or majority language background L2 students, educators of L2 learners, similarly to educators of monolingual first language (L1) learners, are challenged to identify as early as possible children who struggle academically so that they can provide early intervention to address their learning difficulties (Scanlon, Anderson, & Flynn, 2008). In the case of students educated through an L2, identification and support for at-risk learners is complicated by issues related to incomplete acquisition of the L2.

Three broad goals motivated the present studies: (1) to better understand individual differences in L2 decoding and reading comprehension in students educated in an L2 (Study 1); (2) to better understand risk for reading and oral language difficulties in L2 learners (Study 2); and (3) to identify predictors of L2 learning outcomes, including risk for reading and/or language difficulties, using

L1 performance indicators as predictors (Study 1 and 2). A battery of reading-related and oral language tasks was administered in English to a relatively large group of unselected immersion students in Kindergarten (K); both typically developing and those who might be at risk for reading and/or oral language difficulties were included. The goal of administering these tests was to determine which, if any, of them would predict the students' reading and oral language abilities in French, their L2, at the end of Grade 1. The following predictor tests were administered at both the beginning and end of K in English in order to determine how early in their schooling L2 students at risk for reading and oral language development could be identified: receptive vocabulary, pseudo-word repetition, sentence repetition, blending, expressive morphology, letter-name and letter-sound knowledge, word decoding, and rapid automatized naming of objects. These tests and the underlying skills they are thought to assess have all previously been found to be significantly correlated with English oral language and/or reading outcomes in L1 and L2 learners (e.g., August & Shanahan, 2006; Comeau, Cormier, Grandmaison, & Lacroix, 1999; NICHD, 2000;). A test of French receptive vocabulary was also administered to control for prior knowledge of the immersion language, French. Oral language and reading outcome measures were administered at the end of Grade 1, after the students had had two years of instruction exclusively in French. They were administered in order to examine both individual differences in and risk for reading and oral language learning in French. The reading outcome measures were decoding and reading comprehension; and the language outcome measures were comprehension of syntactic structures, and comprehension of increasingly long instructions that contain abstract linguistic concepts.

Study 1 sought specifically to determine if predictor tests administered in the students' L1, English, would predict a significant proportion of variance in their L2 decoding and reading comprehension abilities at the end of Grade 1. Administering predictor tests in their native language avoided problems associated with testing in French, a language most students only began to learn in K. Study 1 also sought to determine if there are unique predictors of decoding and reading comprehension in French as an L2. Identifying unique or at least different sets of predictors for each reading outcome would make it possible to individualize support for immersion students at risk for word decoding and/or reading comprehension. An additional goal was to determine whether a popular theory of reading acquisition applies cross-linguistically, namely the Simple View of Reading (Gough & Tunmer, 1986).

A number of noteworthy findings emerged. First, letter-name knowledge in English and blending in English were significant predictors of French word and pseudo-word decoding at the end of Grade 1. Similar results attesting to the importance of knowledge of the alphabetic principal and phonological awareness (PA) in learning to read have been well documented in both L1 and L2 reading research (e.g., August & Shanahan, 2006; Comeau et al., 1999; Genesee, Lindholm-Leary, Saunders, & Christian, 2006; NICHD, 2000). These findings from Study 1 also suggest that it may be possible to differentially predict L2 decoding versus reading comprehension ability using L1 predictors. In this regard, it was found that letter-name knowledge and blending in English were significant predictors of L2 decoding at the end of Grade 1, while a combination of these two skills along with performance on a language-related test (i.e., rapid automatized naming of objects in L1) was uniquely predictive of L2 reading comprehension. Indeed, up to half of the variance in French word and pseudo-word decoding at the end of Grade 1 and up to three quarters of the variance in reading comprehension using these predictor variables in English could be accounted for.

An additional important finding from Study 1 was that the component model of reading proposed by Gough and Tunmer (1986) applies to reading in an L2. Study 1 provides evidence in support of this particular model of reading in that, by the end of Grade 1, the product of students' L2 decoding and L2 listening comprehension abilities contributed significantly to the prediction of their reading comprehension abilities in French, above and beyond the sum of their L2 decoding and listening comprehension abilities. While there was within language evidence in support of the Simple View (that is, L2 predictors of L2 reading outcomes), this relationship did not appear to hold up cross-linguistically. Specifically, the product of L1 decoding and reading comprehension was not significantly predictive of L2 reading comprehension. These findings are of theoretical significance in that they validate the Simple View of Reading with a new population—FI students, and, practically speaking, they can help inform reading instruction for FI students.

Aspects of the results from Study 1 are corroborated by a study conducted by Jared and her colleagues (Jared, Cormier, Levy, & Wade-Woolley, 2010) which is similar in important respects to the present study and was conducted concurrently with the present study, unbeknownst to us until after the present study had been initiated. As in Study 1, in the study by Jared et al., both decoding and reading comprehension outcomes in French-L2 were examined in a group of students attending FI programs in three cities in Canada, all relatively monolingual. In Jared et al.'s study, English letter-sound knowledge tested in K was found to be the most significant predictor of French decoding in Grade 3, and English receptive grammar tested in K was found to be the most significant predictor of French reading comprehension. In contrast to the participants in the present studies, the participants in Jared's study were taught reading in both French and English from the start of schooling. Thus, the present study provides important corroboration for the importance of these factors in L2 reading outcomes in immersion students who participate in what is arguably the more common model of early immersion wherein literacy instruction is initially provided in only one language. In contrast to Jared et al. (2006), we found that knowledge of the L2 (assessed by a test of French receptive vocabulary) in K was a significant predictor of both L2 decoding and reading comprehension. It seems likely that the findings of Study 1 differ from those of Jared et al. because of the linguistic landscape of each study's geographical setting. Jared's study was conducted in sites that were significantly more monolingual than ours and, thus, there may have been insufficient variation in L2 proficiency among Jared's participants to reveal correlations with reading outcomes. It could be argued that the findings from Study 1 are more likely to generalize to other settings involving

L2 learners than Jared's since L2 learners in many other settings are likely to have had some exposure to the L2 prior to school entry.

The results from Study 1 corroborate the results from yet other studies involving majority language L2 immersion learners in significant respects. Specifically, as in Study 1, Comeau et al. (1999) and Bournot-Trites and Denizot (2005) found significant cross-linguistic correlations between performance on phonological processing tasks performed in the L1 and performance on similar tasks performed in the L2. As well, Comeau et al. found that PA assessed in immersion students' L1 in Grades 1, 3, and 5 was a significant predictor of their reading abilities in French one year later (for similar findings, see also Deacon, Wade-Woolley, & Kirby, 2007; Lafrance & Gottardo, 2005; MacCoubrey, Wade-Woolley, Klinger, & Kirby, 2004). The findings reported in Study 1 also corroborate results reported in research on minority language learners of English-as-a-second-language (see, for example, August & Shanahan, 2006, and Genesee, et al., 2006, for reviews), namely that phonological processing ability assessed in L1 is a strong predictor of decoding skills in L2 and that L1 oral language ability is a strong predictor of L2 reading comprehension. Importantly, research involving minority language learners of English---for example the work of Gottardo, Yan, Siegel, and Wade-Woolley (2001)---has revealed that L1 oral language ability is not correlated with L2 decoding. Gottardo et al.'s cross-sectional (Grade 1 to Grade 8) study of Cantonese learners of English revealed that phonological processing (rhyme detection) in Cantonese was significantly correlated with English decoding but expressive grammar was not. Similar results have been reported for L2 learners who speak a variety of first languages: Spanish, Urdu, Farsi, Portuguese (August & Shanahan, 2006). Thus, the findings reported in Study 1 argue that results from the present studies, although conducted on majority language learners of French as a second language, probably generalize to minority language students being educated in an L2 in other contexts.

At the same time, the findings from Study 1 go beyond what others have found in important ways, in large part, because Study 1 used a much broader range of predictor variables than most other studies (except Jared et al., 2010), and predictions were made from an earlier age (namely, Fall K) than has previously been done (Spring K onward). With respect to age of testing, in Study 1, it was found that crosslinguistic predictions between phonological processing in English, on the one hand, and word decoding and reading comprehension in French, on the other hand, were found even when the predictor tests were administered as early as the Fall of K, before students had had substantial instruction in reading in any language. Similarly, Study 2, to be summarized shortly, found that statistically significant predictions of risk for both reading and oral language difficulties in French-L2 could be made using predictor tests administered as early as Fall of K. Despite this, it was also found in both Studies 1 and 2, not surprisingly, that predictions of reading and oral language outcomes are more significant when based on test scores obtained in Spring of K. In a related vein, Study 1 revealed that the same predictors of word decoding that other researchers have found to be correlated with word decoding continue to be significant correlates even when other, possibly significant correlates (like vocabulary and grammar) are included in the analyses, attesting to the robustness of these predictors.

The goal of Study 2 was to better understand risk for, rather than simply individual variation in, L2 learning. Specifically, Study 2 sought to examine if predictors administered to FI students in their L1 in K could predict their risk for oral language and/or reading difficulty in French-L2 at the end of Grade 1. Study 2 also sought to examine if there are unique predictors of risk for L2 oral language difficulty versus L2 reading difficulty. At the time that Study 2 was carried out, no other study had examined the cross-linguistic prediction of decoding versus reading comprehension in the same group of L2 immersion students (but, see Bournot-Trites & Denizot, 2005, who examined the prediction of L2 decoding versus reading comprehension using L2 predictor tasks). Risk for difficulty was defined in the present study as performing greater than one standard deviation below the mean on specific reading and language tasks; risk for difficulty did not include students simply performing at the lower end of the normal range (i.e., within one standard deviation below the mean). The students in Study 2 are described as being at risk for "difficulty" rather than having an "impairment" or "disability" because "impairment" implies that the difficulties are clinical in nature and, at least in some cases in our sample, labelling a child as "impaired" may be premature.

The results from Study 2 indicated that PA (blending), phonological recoding (rapid automatized naming of objects), and letter-sound knowledge in immersion students' L1 were significant predictors of risk for reading difficulties in French at the end of Grade 1. Risk for oral language difficulties in French, in comparison, was best predicted using performance on sentence repetition, PA, and tense marking in L1. Using these predictors, we were able to identify risk status in each case with more than 70% accuracy.

Previous research has identified predictors of reading and language impairment in L1 but, in the case of language impairment, most studies have involved concurrent rather than prospective predictors (Bedore & Leonard, 1998; Conti-Ramsden, Botting, & Faragher, 2001). With respect to identifying reading impairment in an L2, no studies that we know of have included learners who are actually at risk for reading difficulty (for a discussion of this, see Genesee & Jared, 2008). Rather, they have included children who performed within the normal range of development, albeit at the lower end (e.g., Eagan & Cashion, 1988; Geva & Clifton, 1994). Whether children who are actually at risk present with different profiles of weakness in comparison to children at the low end of the typical range of development is an empirical question that Study 2 sought to answer. With respect to oral language impairment in L2, few studies have examined the prediction issue, and their participants were either simultaneous bilinguals (Paradis, Crago & Genesee, 2005/2006) or a combination of simultaneous and successive bilinguals (Gutierrez-Clellen & Simon-Cereijido, 2007; Gutierrez-Clellen & Simon-Cereijido, 2010). Other studies have been concerned with the comparison of language *outcomes* of bilingual and monolingual children with language impairment (Crutchley, Botting, Conti-

Ramsden, 1997; Gutierrez-Clellen, Simon-Cereijido, & Wagner, 2008; Paradis, Crago, Genesee, & Rice, 2003). Moreover, L2 studies to date on this issue have used only concurrent predictors and their predictors included only L2 indices and not L1 predictors. Study 2 is also unique in that it examined the differential prediction of risk for oral language and reading difficulties in L2 learners using L1 prospective predictors. It is the only study that that we know of that has sought to identify risk for oral language difficulties and reading difficulties in a single sample of students that includes children who perform below the typical range of development.

Based on students' L2 learning outcomes in French at the end of Grade 1, we identified a subgroup (10.5%) of children who appeared to struggle only with L2 reading; a subgroup (7%) who appeared to struggle only with oral language; and a subgroup (8%) who appeared to struggle with both reading and oral language. The existence of these three subgroups in our sample suggests that reading and oral language difficulties, or at least risk for reading and oral language difficulties, are distinct risk profiles that occasionally co-occur. The results of discriminant analyses, which revealed distinct sets of predictors of risk for reading versus oral language difficulty, provide further evidence for the distinctiveness of these risk profiles. More specifically, sentence repetition was found to be a unique predictor of risk for oral language difficulty in Study 2. While there is no consensus about exactly what skills sentence repetition taps into, it is thought to involve both short-term and long-term memory abilities linked to language (Alloway & Gathercole, 2005; Jefferies, Patterson, Jones, Bateman, &

Lambon Ralph, 2004) as well as additional processes that implicate language (Jeffries et al., 2004). Further evidence that sentence repetition taps into language abilities arises from studies that have found that this task is highly correlated with a number of other oral language variables, such as vocabulary and grammar (Stokes, Wong, Fletcher, & Leonard, 2006).

Finally, support for the distinctiveness of these risk profiles is also provided by the results of principal components analysis which revealed that literacy predictors (e.g., PA, letter-name and letter-sound knowledge) clustered together, oral language predictors (e.g., sentence repetition, vocabulary, expressive morphology) clustered together, and each cluster was maximally unrelated to the other within in the entire sample, suggesting that distinct constructs underlie risk for oral language versus reading difficulty. These findings corroborate those reported by Catts, Adlof, Hogan, and Ellis Weismer (2005) for native English speakers and by de Bree and Kerkhoff (2010) for native Dutch speakers. More specifically, these researchers found that a phonological deficit was strongly associated with dyslexia but not with oral language impairment.

Limitations

The primary limitation of these studies is that causality cannot be established since our analyses involve correlations between predictor and outcome variables. However, demonstrating significant correlations is an important first step that lays the groundwork for beginning to establish causality.

A second important limitation is the relatively small number of children who were at risk in our samples and the extent to which this constrained the statistical analyses. As a consequence of the statistical limitations that ensued from small sample sizes, particularly for the at-risk groups, certain findings were presented as preliminary, and replication of these findings with larger sample sizes is warranted. Notwithstanding this, our results provide important leads, some of which pertain to previously unexplored areas (e.g., predicting L2 oral language difficulties and predicting oral language difficulties versus decoding difficulties).

An additional limitation related to the small sample size of the at-risk groups pertains to the role that intervention may have played. The size of our at-risk group made it impossible to even consider examining the role that intervention may have played with respect to our findings. More specifically, some children were or had previously received reading or oral language intervention and, thus, it is possible that the interventions they were receiving may have altered the extent to which our predictor variables were related to their outcomes, or even the risk status that we attributed to them. However, it is likely that the effect of any undocumented intervention would have probably been to diminish the strength of the correlations found in these studies. Indeed, the findings reported here might well have been stronger had children receiving intervention been excluded and/or if the effects of any interventions been controlled for statistically.

A final limitation is the absence of a control group of typically-developing and at-risk children receiving English instruction with whom we could compare the present results. Such a control group had been part of the original research design and, in fact, we had recruited and tested control children. However, it was not possible within the time constraints of this dissertation to recruit and test a sufficiently large control group to make such a comparison with any confidence owing to the relatively small number of monolingual English speaking children attending English language schools in Montreal. As stated in the *Future Directions* section below, we are continuing to recruit and test such a group and it will be possible to make these comparisons at a later date.

Clinical Implications

Beyond their theoretical significance, the findings from these studies are also of clinical significance in that they identify predictors of individual differences in academic areas that are of critical importance to school success -- reading and oral language development. More specifically, the present findings provide critically needed insights into specific written and oral language difficulties that a large proportion of children experience and that often result in their transferring out of immersion programs.

One clinical implication relates to exposure to the L2 prior to school entry. The present results provide evidence, perhaps not totally surprising, that exposure to the L2 prior to school entry is likely to benefit immersion students with respect to learning to read in the L2. A logical recommendation would then be to encourage parents to find ways to expose their child to the L2 prior to school entry, by registering them in sports activities or camps where the L2 is spoken, for example.

The results of our first study further suggest that immersion students at risk for decoding difficulty in French-L2 need instruction that focuses on the same predictors of reading development that have been found to be key for monolingual English learners, that is, letter knowledge and PA. Furthermore, taken together with the body of work suggesting that L2 learners are at increased risk for reading comprehension, but not decoding, difficulty (August & Shanahan, 2006), our findings suggest that L2 learners need instruction that focuses on oral language development to prepare them to acquire advanced level reading comprehension skills in their L2. Indeed, it might be argued that students being educated in their L2 need more focused instruction on oral language development than students educated in their L1 because the latter have extensive opportunities to the oral language in general, whereas the latter do not. Thus, L2 teachers should be trained accordingly and L2 pedagogical materials should reflect the importance of oral language development.

As they relate to the differential prediction of oral language versus reading difficulty, the findings of our second study suggest that it is possible to identify L2 immersion students at risk for either or both types of difficulty using L1 measures early on, at a time when their L2 skills are not sufficiently developed for testing to take place in that language. It follows then that school personnel responsible for screening students for oral language or reading difficulty in immersion settings should be prepared to do so in the child's L1; this is not always the case, especially in Quebec where FI schools are often staffed by predominantly francophone teachers.

When we consider the specific tasks that were most predictive of oral language difficulty in Study 2, i.e., expressive grammar and sentence repetition, it would appear that the screening measures that are commonly used by schools, at least based on the first author’s experience (a certified speech and language specialist), may be inadequate for identifying risk for oral language difficulty since they rarely include such measures. Rather, immersion school screening measures often include measures of L2 vocabulary knowledge and the ability to follow instructions in L2, indicators that are probably too general and may be more related to prior exposure to the L2 rather than language learning difficulty that cuts across languages.

Findings from Study 2 also suggest that the current trend in schools whereby resource teachers provide intervention to children with reading difficulties, speech-language pathologists provide intervention to children with oral language difficulties, and children rarely, if ever, benefit from both types of intervention, is a model of service delivery that fails to meet the needs of children presenting with both types of problems concurrently. A more appropriate model for these children would provide either or both types of intervention on the basis of each child’s level of functioning and response to classroom instruction in each domain. Periodic re-screening of children in the area in which they are not receiving intervention might even be warranted.

Future Directions

Important next steps include tracking Study 2 outcomes into Grade 6 to determine whether and the extent to which the K predictors of oral language or reading difficulty hold up over time. Also related to Study 2, educators, researchers and policy makers are in dire need of a replication of Bruck’s (1978,

1982) early studies of immersion students with oral language difficulty to determine whether immersion program instruction places them at greater risk for academic failure than instruction in their L1. This study would require the inclusion of a control group of English-speaking students in English programs – both typically-developing students and students at risk for impairment. While this issue has been looked at with respect to language impairment, no studies have examined this question with respect to students who perform below norms on reading. We have, until very recently, been recruiting both reading and language impaired children from non-immersion programs, and as these children progress through early elementary school we will soon be able to make comparisons with comparable students in immersion programs. It is hoped that the results stemming from this upcoming study will be used to guide decision making that involves such children.

Future directions for this line of research should also include experiments in intervention that examine whether there is a causal link between the predictor and outcome variables identified in the present studies; that is, does intervention that focuses on these predictor variables (for example, expressive morphology in the case of language impairment) result in greater gains in language development when compared to traditional intervention (that usually also includes vocabulary goals, for example). Again, there is some research that has addressed this question with respect to L2 reading intervention (e.g., Bournot-Trites & Denizot, 2005), but not as it pertains to L2 oral language intervention. In a related vein, there is an important need for future research examining the suitability of intervention delivered in the L1 as a way of maximizing L2 outcomes of children in immersion programs. The reality in many immersion programs in Canada, with Quebec being the main exception, is that school personnel other than homeroom teachers do not know French sufficiently well to provide intervention in that language and, due to time constraints and professional purview, homeroom teachers are unable to provide more than general classroom instruction. Should future research suggest that L1 intervention does not result in sufficiently large gains when compared to L2 intervention for children presenting with oral language or reading difficulty in immersion programs, then administrators would be obliged to consider the ethics of denying children the highest standard of intervention and possibly reconsider the allocation of their resources so that recruitment and training of intervention professionals focuses on bilingual competency.

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