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Uneven Profiles: Language Minority Learners' Word Reading, Vocabulary, and Reading Comprehension Skills

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Abstract

English reading comprehension skill development was examined in a group of 87 native Spanish-speakers developing English literacy skills, followed from fourth through fifth grade. Specifically, the effects of Spanish (L1) and English (L2) oral language and word reading skills on reading comprehension were investigated. The participants showed average word reading skills and below average comprehension skills, influenced by low oral language skills. Structural equation modeling confirmed that L2 oral language skills had a large, significant effect on L2 reading comprehension, whereas students' word-level reading skills, whether in L1 or L2, were not significantly related to English reading comprehension in three of four models fitted. The results converge with findings from studies with monolinguals demonstrating the influence of oral language on reading comprehension outcomes, and extend these findings by showing that, for language minority learners, L2 oral language exerts a stronger influence than word reading in models of L2 reading.

Keywords

English language learners; reading comprehension; vocabulary; structural equation modeling

Models of reading based on research with native English (L1) speakers have long demonstrated the multi-faceted nature of reading comprehension (e.g., RAND, 2002). In particular, these models have highlighted the critical roles of word reading accuracy and fluency in the process of extracting and creating meaning while reading. For monolinguals, much research has demonstrated a persistent influence of accuracy and speed of single word reading in explaining individual differences in reading comprehension outcomes, even for skilled, adult readers (Perfetti, 1985, 1988; Perfetti, Landi & Oakhill, 2005). At the same

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time, vocabulary knowledge has emerged as another important and distinct predictor of reading comprehension across multiple studies with monolinguals (e.g., Anderson & Freebody, 1981; Davis, 1968), particularly for those who have transitioned from “learning to read” in the primary grades to “reading to learn” in the upper elementary grades and beyond (Chall, 1983). The growing population of language minority learners and prevalence of their reading difficulties raises questions about this (already complex) developmental process for children charged with the task of comprehending a text in their second language (L2).

In the last decade, the U.S. population of students who are language minority learners has grown 105 percent, whereas the general school population has grown only 12 percent (National Center for Educational Statistics, 2004). Approximately three quarters of language minority learners come from homes where Spanish is spoken (NCES, 2007). The achievement of language minority learners tends to lag well behind that of their native English speaking peers in all content areas, and these students tend to fall farther and farther behind with increasing years of schooling as reading comprehension comes to dominate all aspects of the curriculum (de Jong, 2004; De George, 1988; Gandara & Rumberger, 2002; National Center for Educational Statistics, 2002). Indeed, these learners face the challenge of negotiating two languages and must learn to analyze and comprehend sophisticated text in a language in which, in many cases, they are not fully proficient. Yet, our understanding of the processes that contribute to reading comprehension are based predominantly on research with native English speakers (for relevant reviews see National Reading Panel, 2000; RAND, 2002; Snow, Burns, & Griffin, 1998). Of research conducted with language minority students, the vast majority of studies have been conducted with children in the primary grades (for a review see Lesaux, Koda, Siegel, & Shanahan, 2006). Thus, there is a need to investigate the factors that influence reading comprehension development of language minority learners in the upper elementary grades.

Findings from studies comparing language minority learners’ reading development in their second language to their monolingual peers indicate that the two groups typically perform at similar levels on measures of phonological processing, word reading, and spelling (e.g., Aarts & Verhoeven, 1999; Carlisle & Beeman, 2000; Lesaux & Siegel, 2003; Lesaux et al., 2006). For example, a meta-analysis based on data from studies that compared language minority learners’ and monolinguals’ word reading skills indicated that these groups were equivalent in word reading accuracy (effect size = $-.09$, ns; Lesaux et al., 2006). In these studies, the proportion of children who experienced word reading difficulties was proportionally the same as in the monolingual population, and their difficulty was similarly explained primarily by a phonological awareness weakness.

However, the findings of studies on reading comprehension paint a very different picture, yielding highly consistent results that, in comparison to their monolingual peers, reading comprehension is an area of weakness for language minority learners (e.g., Aarts & Verhoeven, 1999; Carlisle, Beeman, Davis, & Spharim, 1999; Hutchinson, Whiteley, Smith, & Connors, 2003; Lindsey, Manis, & Bailey, 2003; Proctor, August, Carlo, & Snow, 2005, 2006; Reese, Garnier, Gallimore, & Goldenberg, 2000; Verhoeven, 1990, 2000). Yet, only a small number of these studies has empirically examined the componential L2 skills that influence reading comprehension performance for this group of learners (e.g., Carlisle & Beeman, 2000; Carlisle, Beeman, Davis, & Spharim, 1999; Droop & Verhoeven, 1998; Hutchinson, Whiteley, Smith, & Connors, 2003; Lindsey, Manis, & Bailey, 2003). A notable finding across many of these studies is strong and significant correlations between L2 vocabulary knowledge and L2 reading comprehension for language minority learners (Carlisle, et al., 1999; Carlisle & Beeman, 2000; Droop & Verhoeven, 2003; Hutchinson et al., 2003; Verhoeven, 2000). Additional research focused on cross-linguistic relationships suggests that language minority students may exploit their L1 vocabulary knowledge in

comprehension of L2 texts (Carlisle, et al., 1999; Jimenez, Garcia, & Pearson, 1995, 1996; Nagy, Garcia, Durgunoglu, & Hancin-Bhatt, 1993; Proctor, August, Carlo, & Snow, 2006; Royer & Carlo, 1991; see also Geva & Genesee, 2006 for a review). There is a need for research to deepen our understanding of how myriad underlying skills—in particular L1 and L2 vocabulary knowledge—influence L2 reading comprehension outcomes. Therefore, the present investigation was designed to examine the influence of both L1 and L2 skills on English reading comprehension among a sample of Spanish-speaking language minority learners.

Efforts to postulate a model of reading comprehension for language minority learners have increased our understanding of the interplay among those underlying skills that contribute to reading comprehension performance. Three studies, designed specifically to postulate such models with language minority students in the upper elementary grades, examined the influence of word-level and oral language skills on L2 reading comprehension (Droop & Verhoeven, 2003; Hoover & Gough, 1990; Proctor et al., 2005, 2006).

Hoover and Gough (1990) outlined a simple view of reading in which reading comprehension is comprised of two somewhat independent, yet essential, components—decoding and linguistic comprehension. Investigating this hypothesis with a sample of Spanish-speaking language minority learners in the U.S. followed from first through fourth grade, the authors found that each component, assessed in English, contributed independently to English reading comprehension; they thus argued that either component (or both) could be the source of a given learner's reading difficulties. The authors also found that linguistic comprehension skills explained an increasing proportion of variance in reading comprehension over time.

Similarly, Droop and Verhoeven (2003) examined the contributions of L2 decoding and oral language skills to L2 reading comprehension outcomes with a sample of language minority students in the Netherlands, followed from third to fourth grade. Convergent with Hoover and Gough's postulated model, they found that speed and accuracy of decoding, vocabulary knowledge, and listening comprehension all contributed to comprehension outcomes, but that the influence of decoding skills weakened over time while the influence of oral language skills increased. L2 vocabulary knowledge, which influenced comprehension both directly and indirectly through its influence on listening comprehension, emerged as an important predictor of comprehension.

Finally, in two reports of a study conducted with a sample of fourth grade language minority learners from Spanish-speaking backgrounds in the U.S., Proctor and his colleagues' (2005, 2006) hypothesized models built upon previous efforts by considering not only the role of L2 decoding and oral language skills in L2 reading comprehension, but also the influences of parallel skills in L1. The findings demonstrated that L2 decoding skills (i.e., alphabetic knowledge and word reading fluency), L1 and L2 vocabulary knowledge, and L2 listening comprehension all played important roles in predicting reading comprehension. Corroborating the findings of Hoover and Gough (1990) and Droop and Verhoeven (2003), their research demonstrated that L2 word reading, while a significant predictor, was less predictive of comprehension performance than oral language competencies while L2 listening comprehension exerted the strongest influence on comprehension outcomes. Similar to the pattern that emerged in Droop and Verhoeven's (2003) study, L2 vocabulary knowledge not only directly influenced comprehension, but also exerted an indirect influence through its relationship with listening comprehension (Proctor et al., 2005). Moreover, the contribution of L1 vocabulary knowledge to L2 comprehension was moderated by L2 word reading fluency, such that readers with stronger L2 word reading

fluency benefited more from L1 vocabulary knowledge than those with poorer L2 word reading fluency skills.

Taken together, the findings from these studies suggest that at the upper elementary level, the effect of L2 word reading skills on reading comprehension becomes increasingly weak while the influence of linguistic ability (i.e., vocabulary and listening comprehension) exerts an increasingly strong influence on L2 reading comprehension. These findings guided the hypotheses and analyses in the present study. We anticipated that English word-level reading skills, listening comprehension, and vocabulary knowledge would each explain a significant portion of the English reading comprehension performance variance if included simultaneously in a single model, but that oral language variables would exert a stronger influence on English reading comprehension than word reading. Similarly, in light of research on cross-linguistic transfer of oral language skills noted above and Proctor et al.'s (2006) finding regarding the influence of L1 vocabulary on L2 reading comprehension, we also investigated influence of native language (i.e., Spanish) skills on English reading comprehension outcomes, anticipating that L1 vocabulary knowledge would explain a significant portion of the variance in English reading comprehension.

Method

Participants

The participants for this study were 87 students (39 girls and 48 boys) from 3 schools in a southwestern U.S. large, urban school district; they were followed from the fourth to the fifth grade. The median age of participants was 9 years 9 months in fourth grade and 10 years 9 months in fifth grade. Each of the 3 schools served a student population with low socio-economic status, ranging from 90 to 100% of students receiving free or reduced lunch. Attrition between fourth and fifth grade was minimal; only 3 students from the original sample of 90 were not assessed in fifth grade, and the final sample of 87 did not differ significantly from the original sample on any of the fourth grade measures.

The three schools from which students were recruited were selected because they each offered “bilitracy” classes in which participating children were instructed in both Spanish and English for a portion of each day, with increasing amounts of English instruction in each grade level until fifth grade. Literacy instruction was predominantly in Spanish during kindergarten and first grade, and approximately 80% English, 20% Spanish by fourth grade. These classrooms typically stay intact through the primary grades, such that the “exit” from the program happens in fourth grade. The program was not developed strictly as a vehicle for English acquisition, but rather to develop the Spanish literacy skills for children whose parents enroll them in the program (for a relevant discussion of bilingual programs see Cardenas-Hagan, Carlson, & Pollard-Durodola, 2007). In fifth grade, all students were instructed entirely in English in structured English immersion classrooms. At the time the study was conducted, the district’s reading instruction was guided by a balanced literacy framework. The approach emphasizes the importance of meaning-making in the reading and writing process (e.g., discussing themes in literature with students) using rich children’s literature as opposed to traditional basal readers (e.g., short, decodable text). Unlike scripted curricula that outline on a lesson-by-lesson basis the reading and writing skills that should be taught, the Balanced Literacy approach requires teachers to constantly evaluate the literacy skills of their students and make decisions about what should be taught at the whole group, small group, and individual tutoring level. For teachers in the district, curricular materials include classroom libraries and standards-based curricular guides and benchmark assessments set forth by the district. The authentic classrooms texts, whether in Spanish or English, are published by Houghton Mifflin.

The participants were predominately U.S.-born children of Mexican-American immigrants. Seventy percent of the participants were born in the U.S., whereas the remaining participants were born in Mexico, most of whom immigrated to the U.S. before kindergarten. Seventy-seven percent of the students attended the same school since kindergarten or first grade, whereas another 12% attended another school in the U.S. prior to their current one, and 11% reported attending a school in Mexico prior to the current one. Participants' responses to an interview about language use revealed that their home language was primarily Spanish, whereas they tended to use more English outside the home. Nearly 90% of students reported that their mother spoke "only or mostly Spanish" at home and nearly 70% of the students reported that their father spoke "only or mostly Spanish" at home. In contrast, over 60% of the students reported that they spoke "only or mostly English" with peers outside the home.

Measures

Reading comprehension—In the first year of the study, one measure of English reading comprehension was used. However, given the evidence that different reading comprehension assessments draw on differential skills (e.g., Cutting & Scarborough, 2006; Francis, Snow, August, Carlson, Miller & Iglesias, 2006; Keenan, Betjemann, & Olson, 2008), in the second year of the study, we included a second measure of reading comprehension in order to be able to verify the findings across two measures of this global construct.

The first measure administered was the *Woodcock Language Proficiency Battery-Revised (WLPB-R)* Passage Comprehension (Woodcock, 1991). For this cloze test, participants are asked to read a paragraph with a word missing and then provide the missing word orally. The task administration is discontinued when the participant fails six items in a row. This measure was used to assess reading comprehension in the fourth and fifth grades. The publisher reports an internal consistency reliability coefficient of .88.

The second measure administered was the *Gates-MacGinitie Reading Comprehension Test* (MacGinitie, MacGinitie, Maria, & Dreyer, 2000). In this test, participants are asked to read 13 short passages and then answer multiple-choice questions about the passages, completing as much of the assessment as possible within a 35 minute period. The publisher reports Kuder-Richardson Formula 20 reliability coefficients of .90 to .92 for the fifth grade test. Due to scheduling difficulties, this measure was administered to 74 of the 87 participants in their fifth grade year.

English and Spanish Word-level Reading Skills—Assessments of word reading accuracy, pseudoword reading accuracy, and sight word efficiency were administered to each participant in Spanish and English.

Word reading accuracy was assessed with the *WLPB-R* and *Woodcock Munoz* Letter-Word Identification subtest (Woodcock, 1991; Woodcock & Munoz-Sandoval, 1995). For each of these parallel (Spanish and English) measures, participants are asked to read a list of words of increasing complexity. The task administration is discontinued when the participant fails six items in a row, ending with the last item on the page. The publisher reports internal consistency reliability coefficients of .94 for the English version and .91 for the Spanish version.

Pseudoword reading accuracy was assessed with the *WLPB-R* and *Woodcock Munoz* Word Attack subtest (Woodcock, 1991; Woodcock & Munoz-Sandoval, 1995). For each of these parallel measures, participants are asked to read a list of decodable pseudowords of increasing complexity. The task administration is discontinued when the participant fails six

items in a row. The publisher reports internal consistency reliability coefficients of .87 for the Spanish and English versions.

English word reading fluency was assessed using the *Test of Word Reading Efficiency* (TOWRE; Torgesen, Wagner, & Rashotte, 1999). In this test, participants are asked to read a list of real words as quickly and accurately as possible in 45 seconds. The publisher of the TOWRE reports alternate forms reliability coefficients above .90. Word reading fluency in Spanish was assessed using the Spanish Word Reading Efficiency (Crosson & Lesaux, in press). In this test, developed to be parallel to the TOWRE, participants are asked to read a list of real words as quickly and accurately as possible in 45 seconds.

English and Spanish Oral Language Measures—Assessments of receptive and expressive vocabulary and listening comprehension were administered to each participant, in Spanish and English.

Receptive vocabulary was assessed with the *Peabody Picture Vocabulary Test* (PPVT; Dunn & Dunn, 1997) and *Test de Vocabulario en Imágenes Peabody* (TVIP; Dunn, Padilla, Lugo & Dunn, 1986). In each of these parallel measures, the administrator says a word aloud, and the student chooses from among four pictures the one that best represents the word. The words become increasingly complex and the task administration is discontinued when a specific proportion of items in a given set are failed. The publisher of the PPVT reports an alternate-forms reliability coefficient of .95 and an internal consistency reliability coefficient of .95 for the scores used, while the publisher of the TVIP reports an internal consistency reliability coefficient of .93.

Expressive vocabulary was assessed using the *WLPB-R* and *Woodcock Munoz Picture Vocabulary* subtest (Woodcock, 1991; Woodcock & Munoz-Sandoval, 1995). In each of these parallel measures, the participant is asked to name a picture. The words become increasingly rare and the task administration is discontinued when the participant misses six items in a row. The publisher reports internal consistency reliability estimates of .81 for the English version and .90 for the Spanish version.

Listening comprehension was assessed using the *WLPB-R* and *Woodcock Munoz Listening Comprehension* subtest (Woodcock, 1991; Woodcock & Munoz-Sandoval, 1995). In this test, the administrator reads a cloze passage aloud to the participant. The participant must provide a single word to complete the passage. Passages become more complex in terms of sentence complexity and vocabulary and the task administration is discontinued when the participant misses six items in a row. The publisher reports internal consistency reliability estimates of .85 for the English version and .84 for the Spanish version.

Procedure

A team of trained graduate students administered the assessments in a quiet room. With the exception of the Gates-MacGinitie reading comprehension test, which is designed to be group-administered, all measures were individually administered. These assessments took place during a six-week period in the middle of the academic year.

Analyses

Following univariate analyses to describe the performance of the sample relative to national norms, structural equation modeling (SEM) was used to test models predicting English reading comprehension. SEM has several advantages over traditional multiple regression approaches, most notably, the ability to test a hypothesized model based on a specified

theoretical framework and the ability to create latent composite variables that draw on several measures and thus have greater reliability than any individual measure.

Descriptive analyses presented below were conducted with data from all 87 participants while SEM analyses were conducted with data from 68 of the 74 children for whom complete data, including *Gates MacGinitie reading comprehension* in fifth grade, were available. One participant, identified as a multivariate outlier, was eliminated from the sample of 74, because her scores appeared to reflect error in testing (vocabulary = 99th percentile and listening comprehension = 1st percentile). Five additional participants, identified as univariate outliers, were eliminated from the sample, because their Spanish language scores were so low that they could no longer be described as bilingual (the target population of this study). The values of skewness and kurtosis for the measured variables from this sample of 68 children were reasonable, supporting the conclusion that the assumption of univariate normality had not been violated.

While 68 participants might be considered a small sample size for structural equation modeling, there are several reasons to believe that the present sample size was in fact sufficient to yield a satisfactory solution. First, in their discussion of guidelines for the use of SEM in the psychological and social sciences, Anderson and Gerbing (1988) reported that small sample sizes can result in overly large deviations of the parameter estimates from their population values. This in turn can create two problems: nonconvergence and improper solutions. However, the models reported below exhibited neither of these problems. Second, Tabachnick & Fidell report that “fewer than 10 subjects per estimated parameter may be adequate if the estimated size of effect is large and the measured variables are normally distributed” (2001, pp. 659–660). This was the case in the present analyses. Third, in the absence of convergence problems, the primary drawback to small sample size would be inadequate power for tests of statistical significance (as in traditional regression), thus the interpretation of effects below highlights the magnitude of effects rather than their statistical significance.

Results

Descriptive Results

Prior to modeling reading comprehension, we sought to describe the achievement levels of this sample of Spanish-speaking language minority learners relative to national norms. Table 1 presents the means and standard deviations on all measures for the 87 participants followed from fourth to fifth grade. Although the learners, on average, were near or above national norms on the word-level reading measures in both English and Spanish, they were more than a standard deviation below the national norm on the measures of oral language in English, and nearly a standard deviation below national norms on Spanish oral language measures. Their L2 reading comprehension performance was in the low-average range when assessed with the *WLPB-R* passage comprehension and more than a standard deviation below the national average when assessed with the *Gates-MacGinitie Reading Comprehension Test*. This pattern was consistent in both fourth and fifth grade.

Although there was substantial variation in participants' skills, the vast majority of participants had individual skill profiles that echoed this pattern. Figure 1 displays the bivariate distribution of fifth grade standard scores on a typical oral language measure, the *PPVT*, and a typical decoding measure, the *WLPB-R* letter-word identification subtest, with reference lines for the mean of 100 on national norms. Note that although there are 14 participants with scores above the national mean on both tests (top right quadrant), the majority of participants were either below average in vocabulary but above average in word reading accuracy (top left quadrant) or below average in both skills. Only two participants

had above-average vocabulary combined with below-average word reading accuracy (in the bottom right quadrant). This distribution of skill profiles was consistent across the different measures of English oral language and word-level reading and consistent between fourth and fifth grade.

Predicting English Reading Comprehension from English Skills

The first set of structural equation models examined the role of English oral language and English word-level reading skills in predicting English reading comprehension in this sample of bilingual children. Although the study design allowed for the construction of cross-linguistic latent variables (e.g., Oral Language comprised of English and Spanish indicators), examination of cross-linguistic correlations and confirmatory factor analyses confirmed that English Oral Language and Spanish Oral Language were distinct factors, as were English word-level reading skills and Spanish word-level reading skills (details are available from authors). Thus these factors were modeled independently.

The correlations among the measured variables and their means and standard deviations are presented in Table 2. Note that that reading comprehension measure was moderately correlated with all of the other measured variables, but the correlations were strongest with the oral language measures. Figure 2 shows the hypothesized model depicting the anticipated relations among English oral language, English word-level reading skills, and English reading comprehension. As seen in Figure 2, the model anticipates a correlation among the two endogenous variables but allows each endogenous variable to directly predict the reading comprehension measured variable.

The model depicted in Figure 2 was fit to the covariance matrix using AMOS 6.0 (Arbuckle, 2005). The results, presented in Table 3, show that the model is a good overall fit to the data: $X^2 = 18.44$, comparative fit index = .965, root mean square error of approximation = .089. Both the standardized parameter estimates and their associated z statistics are shown in Table 3. Z values greater than or equal to 2.0 are statistically significant ($p < .05$) (Tabachnick & Fidell, 2001). Four observations should be noted with regard to Table 3. First, the standardized parameter estimates for the indicators of each endogenous variable are quite strong in magnitude, ranging from 0.60 (corresponding to the path between the English Word-Level Reading factor and Word Reading Efficiency in English) to 0.86 (corresponding to the paths between the English Word-Level Reading factor and *WLPB-R* Letter Word Identification). Second, the two endogenous variables were significantly correlated with one another. Specifically, a moderate correlation was observed between English Oral Language and English Word-Level Reading. Third, the endogenous variables differed in how predictive they were of variation in the reading comprehension measured variable. The standardized parameter estimate corresponding to the path between English Oral Language and reading comprehension was strong and statistically significant, suggesting that English Oral Language is highly related to reading comprehension in this sample of bilingual fifth graders. In contrast, the parameter estimate for the path between English Word-Level Reading and reading comprehension was weak and not significantly different from zero, suggesting that decoding skill was not related to reading comprehension skill in this sample. Finally, the squared multiple correlation for the reading comprehension measured variable (.519) indicates that, together, the two endogenous variables account for 52% of the variance in reading comprehension. While this statistic is sizable, it is important to point out that there is considerable variance in reading comprehension left unexplained by the model depicted in Figure 2.

The analyses presented here in detail are based on the fifth grade data, though similar results were obtained using the fourth grade data and using the Passage Comprehension subtest from the *WLPB-R* as the outcome measure. One important difference in the models with

WLPB-R comprehension subtest, which uses a cloze procedure to measure reading comprehension, was in the observed moderate relationship between the English Word-Level Reading Factor and English reading comprehension. In the fourth grade model, the standardized parameter estimate between English decoding and *WLPB-R* passage comprehension was 0.23 ($p=.093$). In the fifth grade model, the standardized parameter estimate between English Word-Level Reading and *WLPB-R* passage comprehension was 0.38 ($p=.006$). Thus, albeit a weak relationship overall, word-level reading appears to play a somewhat stronger role in predicting variation in reading comprehension when it is measured using a cloze procedure than when measured with passages of text and corresponding questions. This difference as a function of test type is consistent with recent research on reading comprehension tests (e.g., Cutting & Scarborough, 2006; Keenan, Betjemann, & Olson, 2008).

Predicting English Reading Comprehension from Spanish Skills

The second set of analyses examined the role of Spanish oral language and Spanish word-level reading skills in predicting English reading comprehension. The correlations, means, and standard deviations for the measured variables are presented in Table 4. An examination of the correlation matrix shows that English reading comprehension is only weakly related to the indicators of Spanish oral language and Spanish word-level reading. Furthermore, while there is a general trend for the Spanish word-level reading and oral language indicators to be moderately intercorrelated, there are several interesting exceptions to this pattern. First, the two Spanish vocabulary measures are only weakly correlated; significance testing indicates that the null hypothesis (that the correlation is different from zero) cannot be rejected. This result may be due to the task requirement difference for these two vocabulary measures in that the *TVIP* is a receptive measure, whereas the *WLPB-R* is an expressive measure; however, it may also be due to differences in the sampling of words in each test. Additionally, the expressive vocabulary measure (from the *WLPB-R*) is moderately correlated with the Spanish word-level reading measures, particularly the untimed word and nonword reading measures from the *WLPB-R*.

Figure 3 depicts the cross-language structural equation model, which as before, was fit to the covariance matrix using AMOS 6.0 (Arbuckle, 2005). The results, presented in Table 5, show that the model is an adequate fit to the data: $\chi^2 = 17.57$, comparative fit index = .966, root mean square error of approximation = .083. Table 4 presents the standardized parameter estimates and their associated z statistics. Several results are noteworthy. First, while the indicators of the endogenous variables are moderate to strong and statistically significant, the Spanish Oral Language factor is more strongly indicated by Spanish listening comprehension than by either of the Spanish vocabulary measures. Second, as predicted by the observed correlations between the expressive Spanish vocabulary measure and the Spanish word-level reading measures, the correlation between the two endogenous variables is weak but significant. Finally, consistent with the low observed correlations between English reading comprehension and the indicator variables, the paths between the endogenous variables and English reading comprehension are weak. Statistical testing indicates that the null hypothesis cannot be rejected for either of the paths tested. The weakness of the relationship between the Spanish factors and English reading comprehension is also apparent in the squared multiple correlation statistic. According to this model, Spanish oral language and Spanish word-level reading explain only 14% of the variance in English reading comprehension.

As with the previous analyses, the model presented here is based on the fifth grade data; similar results were obtained with the fourth grade data and using the Passage Comprehension subtest from the *WLPB-R* as the outcome measure. As observed with the within-English model, one important difference in the models with *WLPB-R* comprehension

subtest as the outcome was in the observed moderate relationship between the Spanish Word-Level Reading Factor and English reading comprehension. In the fourth grade model, the standardized parameter estimate between Spanish decoding and *WLPB-R* passage comprehension was 0.35 ($p=.025$). In the fifth grade model, the standardized parameter estimate between Spanish decoding and *WLPB-R* passage comprehension was 0.40 ($p=.003$). Thus, albeit a weak relationship overall, word-level reading skills appear to play a somewhat stronger role in predicting variation in reading comprehension when it is measured using a cloze procedure than when measured with passages of text and corresponding questions. This finding is addressed in the next section.

Discussion

The overarching goal of this study was to begin to generate specific findings about the relationship between oral language and literacy skills (L1 and L2) and L2 reading comprehension performance, for a group of Spanish-speaking language minority learners followed from fourth through fifth grade. Indeed, this is a point in schooling when reading comprehension becomes central to academic achievement, yet existing research indicates that language minority learners have difficulty reading with understanding (Carlisle & Beeman, 2000; Carlisle, Beeman, Davis, & Spharim, 1999; Droop & Verhoeven, 1998; Hutchinson, Whiteley, Smith, & Connors, 2003; Lindsey, Manis, & Bailey, 2003). Yet, few studies have investigated the process of reading comprehension for this group of learners. Further, very few studies have used multiple indicators for the constructs of interest; doing so increased the rigor of the present study by allowing for the creation of composite variables, via structural equation modeling, which are less susceptible to measurement error due to task effects.

While convergent with much of the research on reading comprehension processes for L1 and L2 learners, the findings diverge in interesting ways. Most notably, we identified—descriptively and analytically—a dissociation between word-level reading skills and reading comprehension, whether measured in English or in Spanish. The children in the sample, homogeneous with respect to language and instructional background, had word reading skills well within the average range (approximately the 50th percentile) and reading comprehension skills significantly below average (approximately the 20th percentile). While word reading had a weak relationship with English reading comprehension; oral language (i.e., vocabulary and listening comprehension), in contrast, emerged as a strong, significant predictor of reading comprehension. This relationship was moderated in part by the type of reading comprehension assessment employed. Consistent with recent research on reading comprehension assessments (e.g., Cutting & Scarborough, 2006; Keenan et al., 2008), word-level reading skills appear to play a somewhat stronger role in predicting variation in reading comprehension when it is measured using a cloze procedure (i.e., *WLPB-R Passage Comprehension*) than when measured with passages of text and corresponding questions (i.e., *Gates MacGinitie Reading Test*). It is important to note, however, that overall, the relationship between word reading and reading comprehension is a weak relationship—far weaker than the relationship between oral language and reading comprehension.

Previous research (Droop & Verhoeven, 2003; Hoover & Gough, 1990; Proctor et al., 2005; 2006) has lent support to the simple view of reading, originally offered as a model of monolinguals' reading comprehension, which postulates that comprehension is a product of linguistic and decoding skills. These studies have also shown that the effect L2 word-level reading skills on reading comprehension becomes increasingly weak during the elementary grades, while the influence of linguistic ability (i.e., vocabulary and listening comprehension) exerts an increasingly strong influence on L2 reading comprehension. Based on these findings, we anticipated that including measures of word-level reading skills

(i.e., word recognition and decoding skills) *and* measures of oral language skills (i.e., word knowledge and oral comprehension) simultaneously in a single model, each would explain a significant portion of the variance in English reading comprehension performance, but that oral language variables would exert a stronger influence on L2 reading comprehension than decoding. Thus we were struck that—in contrast to previous models of L2 reading comprehension and our hypotheses—word-level reading skills failed to explain a significant portion of the variance in reading comprehension in three of the four models fitted. In the model where it was significant, the relationship was generally weak as compared to the relationship between oral language and reading comprehension.

A possible explanation for why our findings diverge from previous investigations may be, in part, the developmental nature of learning to read. Indeed, the models hypothesized by Hoover and Gough (1990) and Droop and Verhoeven (2003) were based on longitudinal studies with children from first through fourth grade and third through fourth grade, respectively. In both cases, they identified a change in the relationships among word reading, oral language skills, and reading comprehension, with word reading exerting less and less of an influence and oral language explaining an increasing amount of the variance. The present study focused on the upper elementary years only, investigating development of literacy skills from fourth to fifth grade. The dissociation between word reading skills and reading comprehension was evident at both fourth and fifth grade.

The striking dissociation between word reading skill and reading comprehension observed in our sample of native Spanish-speakers learning to read in English can be explored in relation to the literature focused on the sources of reading difficulty of English-speaking monolinguals with average word reading skills and poor reading comprehension (e.g., Cain & Oakhill, 1998; 2000; 2006; Cain, Oakhill, & Bryant, 2000; Seigneuric, Ehrlich, Oakhill, & Yuill, 2000; Yuill & Oakhill, 1991). These studies have been conducted predominantly in the UK and exclude language minority learners. Yet this profile occurred naturally in an unselected sample of fourth grade Spanish-speaking language minority learners, most of whom had been enrolled in US schools since kindergarten. The fact that this specific profile was overwhelmingly apparent in this population of Spanish-speaking language minority learners enrolled in urban schools confirms that indeed many learners in this growing population are at significant risk for comprehension difficulties and, in turn, school failure.

In the present study conducted with Spanish-speaking language minority learners, the overwhelming tendency of the group was to have English receptive vocabulary scores well below average ($M=19^{\text{th}}$ percentile) and Spanish receptive vocabulary scores in the low average range ($M=35^{\text{th}}$ percentile), demonstrating that limited vocabulary knowledge, both in the L1 and L2, was contributing to their reading comprehension difficulties. In contrast, studies with monolinguals displaying a similar dissociation suggest that the underlying sources of difficulty are highly variable, including vocabulary knowledge, inference making, working memory, and story structure knowledge (Cain & Oakhill, 2006); these samples of native English-speaking children with a specific comprehension problem do not show unequivocally low vocabulary levels and in many cases there are no differences in vocabulary levels between the good and poor comprehension groups (Cain & Oakhill 2006; Cain & Oakhill, 1999; Cain, Oakhill & Bryant 2000; Cain, Oakhill, Barnes & Bryant, 2001). More research to expand the line of research on poor comprehenders to reflect the language-related changes in the school-aged population is needed.

The findings from this study can also be interpreted in the context of the research conducted with monolingual children that has identified the “fourth grade slump” (for relevant discussions see Chall, Jacobs, & Baldwin, 1990; Chall & Jacobs, 2003; Snow, Barnes, Chandler, Goodman, & Hemphill, 1991). This research finds that even though the vast

majority of young readers can manage simple texts, many students—particularly those from low-income families—struggle to comprehend more advanced academic texts, narrative and expository, due in large part to lacking the complex, academic vocabulary inherent in the texts. Our findings suggest that Spanish-speaking language minority learners from low-income backgrounds, who appear to develop good word reading skills but have persistently low vocabulary, may be particularly at-risk for experiencing reading comprehension difficulties in the upper elementary years. To that end, the research on the fourth grade slump should be conducted with special attention to the growing population of language minority learners in today's classroom, particularly the large and growing population of those from low-income households.

As previously noted, the Spanish speaking language minority learners who participated in this study received instruction in Spanish from kindergarten through third grade; this provided the opportunity to examine the role of Spanish skills in English reading comprehension. However, our findings diverge somewhat from Proctor and his colleagues' findings regarding cross-linguistic influences—particularly that of oral language—on L2 reading comprehension. In our analyses, the cross-linguistic model put forth by Proctor et al (2006) didn't converge with our data and overall, the relationships between Spanish oral language and English reading comprehension and between Spanish word reading and English reading comprehension, were very weak. Where there was slight convergence is that in our fifth grade model fitted with the *WLPB-R* passage comprehension measure, L1 word reading emerged as a significant, albeit relatively weak, predictor. Proctor and colleagues found an effect for L1 decoding, operating on reading comprehension through oral language. These differences may be due to a number of factors, such as differences in language of reading instruction for the samples studied, measures that are not adequately capturing unobserved relationships, and statistical power to do so. Given these are so few studies conducted with fourth and fifth graders, more research on the role of L1 language and literacy skills in L2 reading comprehension is needed.

Summary and Educational Implications

The development of reading for language minority learners is an area of research in need of a focus on replication, with samples reflecting the heterogeneity of the population of language minority learners in US schools and in sufficiently different instructional contexts. The accumulation of converging lines of evidence is needed to arrive at robust findings about this complex process for these learners faced with the task of reading in their second language. Specifically, further studies must be designed to replicate the findings of the current study, which suggest that reading comprehension is overwhelmingly influenced by L2 oral language skills. Replication is especially important given the differences in instructional and demographic contexts of Spanish-speaking language minority learners (August, 2006; Lesaux & Crosson, 2005; Rumberger & Gandara, 2002). Further, the sample size in the present study, while consistent with previous work in this area, remains relatively small in absolute terms. In our case, the decision was made to allocate study resources towards in-depth individual assessment in both languages. Subsequent studies with larger samples are needed.

Moreover, the findings from this study highlight important educational implications. Likely representative of other Spanish-speakers enrolled in urban schools, the learners in this study are at very significant risk for school failure and limited access to post-secondary educational opportunities. Effective interventions for this population through the middle and high school, when the language demands of reading steadily increase and comprehension is central to academic success, are needed. In particular, these results underscore the profound need to enrich oral language competencies (e.g., breadth and depth of vocabulary knowledge) to improve reading comprehension outcomes. Research with monolingual

speakers (e.g., Graves, 2000, 2006; Fukkink & de Glopper, 1998; Stahl & Nagy, 2006; Stoller & Grabe, 1995; Swanborn & de Glopper, 1999), recent research with language minority learners (Lesaux, Kieffer, Faller, & Kelley, 2010), and relevant instructional agenda-setting reports (see National Council of Teachers of English & International Reading Association, 1996) suggest that vocabulary instruction in classrooms such as those in which the present study was conducted must be multi-faceted in nature, with explicit attention to the interrelatedness of content-area knowledge and academic language. Further, focus needs to be placed on high-utility academic words that appear in print and carry substantial weight in understanding and acquiring new knowledge from text, the need to know multiple meanings of many words, and the need for students to be equipped with strategies to learn words independently while reading text.

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Figure 1. Scatter plot illustrating the bivariate distribution of PPVT vocabulary and WLPB-R letter-word identification scores in English among students in fifth grade ($n = 87$).

Figure 2. Structural equation model testing the role of English oral language and English word-level reading skills in predicting English reading comprehension among fifth grade bilingual students.

Figure 3. Structural equation model testing the role of Spanish oral language and Spanish word-level reading skills in predicting English reading comprehension among fifth grade bilingual students.

Table 1

Summary of Descriptive Statistics (n = 87).

		Fourth Grade Mean (SD)	Fifth Grade Mean (SD)
English	WLPB-R Passage Comprehension SS	96.94 (9.86)	95.18 (9.12)
	Gates-MacGinitie Reading Comprehension NCE*	--	26.80 (14.55)
	Peabody Picture Vocabulary SS	82.02 (13.86)	84.85 (14.62)
	WLPB-R Picture Vocabulary SS	77.86 (15.78)	82.47 (14.63)
	WLPB-R Listening Comprehension SS	80.36 (11.68)	85.56 (15.89)
	TOWRE Sight Word Efficiency SS	100.52 (11.51)	101.33 (10.45)
	WLPB-R Letter-word Identification SS	101.00 (10.65)	103.49 (11.70)
	WLPB-R Word Attack SS	100.74 (14.92)	105.06 (15.90)
Spanish	Peabody Picture Vocabulary SS	93.94 (15.74)	91.80 (15.95)
	WLPB-R Picture Vocabulary SS	85.75 (21.62)	88.92 (20.02)
	WLPB-R Letter-word Identification SS	120.47 (23.09)	124.27 (23.02)
	WLPB-R Word Attack SS	111.09 (17.81)	111.60 (18.46)
	Sight Word Efficiency raw score	49.57 (13.33)	54.52 (13.74)

Table 2

Correlations, Means, and Standard Deviations of Measured Variables Used in Within-Language Structural Equation Modeling.

Indicators	1	2	3	4	5	6	7	8.
1. WLPB English Picture Vocabulary	---							
2. Peabody Picture Vocabulary Test -- English	.51	---						
3. WLPB English Listening Comprehension	.57	.67	---					
4. Sight Word Efficiency English	.24	.26	.16	---				
5. WLPB English Letter Word Identification	.25	.35	.51	.49	---			
6. WLPB English Word Attack	.24	.21	.32	.50	.67	---		
7. Gates MacGinitie Reading Comprehension -- English	.47	.60	.58	.34	.40	.34	---	
8. WLPB Passage Comprehension -- English	.43	.46	.53	.49	.51	.39	.64	---
Means (Standard Deviations)	486.78 (13.16)	112.06 (20.87)	484.81 (13.61)	69.94 (9.04)	503.47 (14.10)	502.51 (13.04)	469.84 (44.59)	493.03 (11.14)

Note. WLPB = Woodcock Language Proficiency Battery; correlations greater than 0.24 are statistically significant ($p < .05$).

Table 3

Values of Standardized Parameter Estimates, Test Statistics (z), and Goodness of Fit for Structural Equation Model in Figure 1 of the Relations Among English Oral Language, English Reading Fluency and English Decoding and English Reading Comprehension.

Measurement Model Paths	Parameter Estimate	Z Statistic
EOL → WLPB Picture Vocabulary English	.66	5.3
EOL → Peabody Picture Vocabulary Test English	.80 ^a	---
EOL → WLPB Listening Comprehension English	.85	6.8
EWR → WLPB English Letter Word Identification	.86 ^a	---
EWR → WLPB English Word Attack	.78	5.7
EWR → Sight Word Efficiency English	.60	4.6
EOL → Gates-MacGinitie Reading Comprehension English	.64	4.6
EWR → Gates-MacGinitie Reading Comprehension English	.13	1.0
Correlation Among Factors		
EOL ↔ EWR	.53	3.1
$\chi^2 = 18.44$, CFI = .965, RMSEA = .089 SMC Gates MacGinitie Reading Comprehension English = .519		

Note. EOL = English Oral Language Factor; EWR = English Word-Level Reading Factor; WLPB = Woodcock Language Proficiency Battery; GORT = Gray Oral Reading Tests; CFI = Comparative Fix Index; RMSEA = Root Mean Square Error of Approximation; SMC = Squared Multiple Correlation.

^aThe unstandardized path for this indicator was set equal to 1 because it serves as the reference indicator for this endogenous variable. For this reason, no significance tests were performed.

Table 4

Correlations, Means, and Standard Deviations of Measured Variables Used in Cross-Language Structural Equation Modeling.

Indicators	1	2	3	4	5	6	7	8
1. WLPB Spanish Picture Vocabulary								
2. Peabody Picture Vocabulary Test – Spanish	.21							
3. WLPB Spanish Listening Comprehension	.47	.49						
4. Sight Word Efficiency Spanish	.32	.11	.17					
5. WLPB Spanish Letter Word Identification	.47	.17	.20	.70				
6. WLPB Spanish Word Attack	.44	.14	.28	.71	.77	--		
7. Gates MacGinitie Reading Comprehension -- English	.14	.19	.27	.26	.26	.27	---	
8. WLPB Passage Comprehension -- English	.27	.17	.24	.41	.41	.40	.64	---
Means (Standard Deviations)	495.65 (13.60)	77.04 (9.57)	493.54 (7.91)	55.29 (13.36)	527.40 (24.03)	508.09 (15.30)	469.84 (44.59)	493.03 (11.14)

Note. WLPB = Woodcock Language Proficiency Battery; correlations greater than 0.24 are statistically significant ($p < .05$).

Table 5

Values of Standardized Parameter Estimates, Test Statistics (z), and Goodness of Fit for Structural Equation Model in Figure 2 of the Relations Among Spanish Oral Language, Spanish Decoding, and English Reading Comprehension.

Measurement Model Paths	Parameter Estimate	Z Statistic
SOL → WLPB Picture Vocabulary Spanish	.56	3.3
SOL → Peabody Picture Vocabulary Test Spanish	.55 ^a	---
SOL → WLPB Listening Comprehension Spanish	.85	3.3
SWR → Sight Word Efficiency Spanish	.81	7.8
SWR → WLPB Spanish Letter Word Identification	.87 ^a	---
SWR → WLPB Spanish Word Attack	.89	8.6
SOL → Gates-MacGinitie Reading Comprehension English	.23	1.5
SWR → Gates-MacGinitie Reading Comprehension English Correlation Among Factors	.22	1.6
Correlation Among Factors		
SOL ↔ SWR	.39	2.1
$\chi^2 = 17.57$, CFI = .966, RMSEA = .083 SMC Gates MacGinitie Reading Comprehension English = .141		

Note. SOL = Spanish Oral Language Factor; SWR = Spanish Word-Level Reading Factor; WLPB = Woodcock Language Proficiency Battery; CFI = Comparative Fit Index; RMSEA = Root Mean Square Error of Approximation; SMC = Squared Multiple Correlation.

^aThe unstandardized path for this indicator was set equal to 1 because it serves as the reference indicator for this endogenous variable. For this reason, no significance tests were performed.