Published in final edited form as:

J Educ Psychol. 2010 August ; 102(3): 701–711. doi:10.1037/a0019135.

Predictors of Reading Comprehension for Struggling Readers: The Case of Spanish-speaking Language Minority Learners

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Abstract

This longitudinal study examined the process of English reading comprehension at age 11 for 173 low achieving Spanish-speaking children. The influence of growth rates, from early childhood (age 4.5) to pre-adolescence (age 11), in vocabulary and word reading skills on this complex process were evaluated using structural equation modeling. Standardized measures of word reading accuracy and productive vocabulary were administered annually, in English and Spanish, and English reading comprehension measures were administered at age 11. Latent growth curve analyses revealed that English skills accounted for all unique variance in English reading comprehension outcomes. Further, expected developmental shifts in the influence of word reading and vocabulary skills over time were not shown, likely on account of students' below grade level reading comprehension achievement. This work underscores the need for theoretical models of comprehension to account for students' skill profiles and abilities.

Introduction

Native English speakers bring much to the process of learning to read; by about age 6, the average child knows approximately 10,000 words (Anglin, 1993) and has acquired approximately 90% of adult language structures (Daniels, 1998). The task at hand is for the child to learn to recognize printed words, words that in beginning reader texts are largely already part of the child's oral vocabulary (Long, 2001). This situation is notably different, however, for the most rapidly growing segment of the school-aged population in the United States: U.S.-born children of immigrants from Spanish-speaking homes (Fry & Gonzales, 2008; NCES, 2007). For these Language Minority (LM) learners, school often represents the first formal encounter with the English language. Thus, LM learners must simultaneously learn vocabulary and linguistic structures if they are to make meaning of the print they learn to decode. Beyond its role in school success, successful text comprehension is increasingly important for meaningful, active participation in society.

In addition to the risk associated with learning to read in a language in which one is not fully proficient, the majority of Spanish-speaking LM learners in the U.S. carry with them many

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other risk factors associated with reading difficulties, including household incomes at or near poverty levels (Fry & Gonzales, 2008; Hernandez, Denton, & Macartney, 2008), low parental education and literacy rates (Capps et al., 2005; Hernandez et al., 2008), and enrollment in under-resourced, low-performing schools with high concentrations of students of color (Capps et al., 2005; Consentino de Cohen, Deterding, & Chu Clewell, 2005). In the U.S., this is a population with generally poor reading outcomes (for a review, see August & Shanahan, 2006). For example, according to recent statistics, half (50%) of Latino fourth grade students scored at the *below basic* level in reading, compared to 22% of their White classmates (NCES, 2007). In addition, Latinos account for nearly half (46%) of all high school dropouts (Snyder, Dillow, & Hoffman, 2007).

The achievement gaps between monolingual and LM learners are, indeed, well-documented. However, in spite of the robust evidence—derived primarily from cross-sectional research—that LM learners struggle academically, research has yet to longitudinally investigate the factors that influence the process of reading comprehension among Spanish-speaking LM learners, especially for those who are struggling readers. Assessing LM learners' skills at one or even two points in time, while informative about absolute achievement levels and important for documenting gaps, does not provide insight into patterns of growth in key reading and oral language skills and the influence of these rates of growth on reading comprehension outcomes. The present study was thus designed to examine the influence, both initial levels and rates of growth, of word reading and vocabulary skills (from age 4.5 to 11) on students' English reading comprehension achievement at age 11, which was three grade levels below national norms at the time of the study.

The Development of Reading Comprehension

The process of comprehending written text is developmental and multi-faceted, involving the orchestration of many skills (e.g., RAND Reading Study Group, 2002). That is, the ability to comprehend text is dependent upon, but not limited to, the nature of the text being read (e.g., narrative vs. expository), the capabilities of the reader (e.g., memory, word reading and vocabulary skills), and the purpose for reading (e.g., skimming for key information vs. answering questions on a test). There is wide consensus, however, that word reading and language comprehension are the primary component skills, and that limitations in either skill contribute to compromised reading comprehension—the ultimate goal of reading instruction. The Simple View of Reading (Gough & Tunmer, 1986), one of the most influential and parsimonious theoretical accounts of reading comprehension, underscores the central roles that word reading and language comprehension skills play in reading comprehension outcomes for monolingual speakers (e.g., Catts, Adlof, & Weismer, 2006; Johnston & Kirby, 2006; Vellutino, Tunmer, Jaccard & Chen, 2007). In order to comprehend text effectively, students must be able to identify words effortlessly and must simultaneously understand the words' meanings.

Research guided by this model has demonstrated that there are developmental shifts in the relative contribution of word reading and language comprehension to reading comprehension outcomes. Because the language of text is relatively basic in the primary grades, the words children encounter are typically already part of their oral vocabulary (Long, 2001). Thus, owing to greater variability in children's word reading skills, they are most predictive of reading outcomes during these years (e.g., Adams, 1990; Chall, 1983, 1996; Francis, Fletcher, Catts, & Tomblin, 2005). Once children develop adequate word reading skills, however, their influence on comprehension outcomes tends to diminish because, at the group level, there is less variation in these skills. In contrast, the influence of language comprehension skills tends to increase because the variation across students in their knowledge of the (more sophisticated) words they are expected to comprehend increases (e.g., Catts, Hogan, & Adlof, 2005; RAND

Reading Study Group, 2002). Even though language comprehension skills may take over as the stronger predictor of reading comprehension at the group level, at the individual level a student may fail to comprehend text because of poor word reading, poor language comprehension, or a combination of both.

These findings are particularly salient when investigating and contemplating the reading comprehension process for LM learners; unlike word reading skills, LM learners' language comprehension skills, and in turn reading comprehension scores, do not typically develop to age-appropriate levels even after several years in school (for a review, see Lesaux, 2006). Yet, to date only three studies (Hoover & Gough, 1990; Nakamoto, Lindsey, & Manis, 2008; Proctor, Carlo, August, & Snow, 2005, 2006) have investigated reading comprehension for U.S. Spanish-speaking LM learners from low-income homes who are beyond the primary grades. In addition, one study conducted in the Netherlands (i.e., Droop & Verhoeven, 2003) contributes to our understanding of low-income LM learners' reading outcomes.

Guided by the Simple View of Reading (Gough & Tunmer, 1986), together these studies modeled the contribution of word reading and language comprehension (listening comprehension and/or vocabulary) to reading comprehension. Hoover and Gough (1990) used regression analyses at each grade level, from first through fourth grade, finding support for the Simple View among their sample. Using a path model analysis, Proctor and colleagues (2005) similarly found that both language comprehension and word reading contributed to reading comprehension outcomes of their fourth grade LM learner sample. Most recently, Nakamoto and colleagues (2008) used structural equation modeling (SEM) to investigate the association of third grade language comprehension and word reading latent variables on sixth grade reading comprehension, in Spanish and English, finding that both skills contributed to students' reading comprehension. Finally, in their study with Moroccan- and Turkish-speaking LM learners from low-income homes in the Netherlands, Droop and Verhoeven (2003) also used SEM, likewise demonstrating that both word reading and language comprehension contributed to students' reading comprehension from third to fourth grade. In each study, except that by Nakamoto and colleagues, language comprehension became the more important predictor by the upper elementary years.

While these cross-sectional studies find support for the important roles of both word reading and language comprehension to reading comprehension outcomes, the studies to date have not attended to the influence of rates of growth in word reading and language comprehension on this complex developmental process. Such a design would provide specific information to inform efforts aimed at narrowing the achievement gap, particularly with respect to answering questions about the specific skills to be targeted and the timing and intensity of interventions. Additionally, language comprehension has been defined and assessed in a variety of ways, but language limitations at the vocabulary level continually emerge as a major factor limiting LM students' reading comprehension performance (e.g., Garcia, 1991, Verhoeven, 1990). In fact, compared to monolingual speakers, listening comprehension tends to be more dependent upon LM learners' vocabulary knowledge (Droop & Verhoeven, 2003). Further, even though LM learners by definition come from homes in which another language is used, only one study (Proctor et al., 2006) has attended to the influence of native language skills on reading outcomes. More research, especially longitudinal work that uses advanced modeling techniques, conducted with struggling readers is needed to build upon existing findings, to inform a model of comprehension for this population, and ultimately to inform effective instructional approaches to meet LM learners' academic needs.

Present Study

This longitudinal study was designed to build upon and advance research on LM students' reading comprehension, with a focus on the large population of Spanish-speaking learners from

low-income homes who are struggling readers. Building upon the studies reviewed above (Droop & Verhoeven, 2003; Hoover & Gough, 1990; Nakamoto et al., 2008; Proctor et al., 2005, 2006), we focus on the contribution of word reading and vocabulary, over time, to reading comprehension outcomes, in a sample of Spanish-speaking LM learners from low-income homes. Specifically, we investigated the extent to which not only initial status (i.e., intercept at age 4.5), but also rates of growth (i.e., slope from age 4.5 to 11) in English and Spanish word reading and vocabulary skills explain variation in English reading comprehension outcomes at age 11. We focus on an English model of reading comprehension because students need to be proficient in English for academic success in U.S. classrooms, but also because students in the sample received English instruction from the very beginning, and thus the development of reading comprehension skills in the native language cannot be assumed.

Consistent with previous work, we hypothesized that word reading and vocabulary skills would be significant predictors of students' reading comprehension, but, given the scarcity of longitudinal work conducted with low achieving Spanish-speaking LM students, it was unclear whether word reading or vocabulary would explain a greater share of the variance in their comprehension outcomes. However, given students' English instructional context, we hypothesized that Spanish vocabulary and word reading skills would not be significant predictors of English reading comprehension, once parallel English skills were accounted for in the model.

Method

Study Design

Spanish-speaking families were recruited for participation when their children were four-and-a-half-year-olds. At study entry, participating children ($n = 387$) were enrolled in 14 Head Start programs and 2 public preschool programs in the Northeastern U.S., and were followed from age 4.5 to 8 (preschool through second grade). One-hundred and seventy-three families were then re-recruited into the study at 11 years of age (fifth grade); together, these students attended 75 schools in the Northeastern U.S. Reflecting recent national trends, nearly all students (94%) had been educated in English-only classrooms. There were no significant differences in key demographic characteristics (family income and home language use) and in Spanish and English vocabulary and word reading skills between the children who were and were not successfully recruited for participation at follow-up (all p -values $>.05$).

Participants

A parent phone interview was administered at study entry and at follow-up to gather data on demographics and language use. At both time points, over 90% of the interviewees were mothers. All children had mothers in the household, but a group of children (30% at study entry and 37% at follow-up) did not have a father in the household. Thus, we report on maternal demographic characteristics. The interview was adapted from a demographic questionnaire developed by the Development of Literacy in Spanish Speakers (DeLSS) project and was prepared in Spanish and English. As shown in Table 1, the great majority of children were born in the U.S., and nearly all parents identified their children as Latino. In contrast, the great majority of mothers were born outside the U.S. Although there was some variation, over one-third of mothers had less than a high school education and over 50% of families lived in deep poverty or in poverty.

Parents also responded to questions about language use in the home at study entry and at follow-up. At study entry, 47% of parents or guardians reported using only or mostly Spanish at home with children, compared with 22% at age 11. Importantly, however, none of the children received all of their input in English at age 4.5 and only three children (2%) did so at age 11.

Similarly, parents reported a shift toward more English use by the children themselves over time; at age 4.5, 45% used only or mostly Spanish at home with their families, compared to 17% at age 11. Thus, the children in this study were effectively in mixed-language environments, with at least some Spanish exposure and use at home through age 11.

Finally, from state websites, we obtained information on students' school characteristics for the 2007-2008 year. Nearly all students (96%) were enrolled in public schools, with the majority (83%) receiving Title I funds, designated for schools with high percentages of children from low-income families. In these schools, on average, 66% of students were from low-income households and 80% were from minority backgrounds (58% Latino). On average, 52% of all students in these schools scored in the *needs improvement* or *warning/failing* category on the state English Language Arts and Mathematics test.

Procedure

Children's vocabulary and word reading skills were assessed at six time points: fall of preschool, spring of preschool, kindergarten, first grade, second grade, and fifth grade. Reading comprehension was tested once, in the spring of fifth grade. Seven college-educated Spanish-English bilingual research assistants were trained to administer the individual assessments in a quiet room at the children's schools, homes, in community libraries, or after-school programs. Children received a \$10 gift card to thank them for their participation.

Measures

Standardized measures of children's language and reading were administered. The Woodcock Language Proficiency Battery- Revised (WLPB-R; Woodcock, 1991; Woodcock & Muñoz-Sandoval, 1995) was used to obtain estimates of children's skills in Spanish and English. The WLPB-R Spanish and English forms were both normed on monolingual populations and are designed to measure the same abilities. However, each form contains unique item content, allowing scores from the two tests to be compared without concerns that experience with the content of the test in one language will improve performance in the other language. English reading comprehension, assessed at age 11, was estimated as a latent construct comprised of scores on three standardized measures (see below).

Word Reading—Word reading in Spanish and in English was assessed with the Letter-Word Identification subtest of the WLPB-R (Woodcock, 1991; Woodcock & Muñoz-Sandoval, 1995). Children are asked to read a list of real words of increasing complexity. The task is discontinued when the child misses six items in a row. The publisher reports median internal consistency reliability coefficients of .91 for the Spanish version and .92 for the English version.

Productive Vocabulary—Vocabulary in Spanish and in English was assessed with the Productive Vocabulary subtest of the WLPB-R (Woodcock, 1991; Woodcock & Muñoz-Sandoval, 1995). Children are asked to name pictured objects that are ordered by increasing difficulty. The task is discontinued when the child fails six items in a row. The publisher reports median internal consistency reliability coefficients of .91 for the Spanish version and .86 for the English version.

Reading Comprehension—Three reading comprehension measures were administered to children in English. The Passage Comprehension subtest of the WLPB-R (Woodcock, 1991) is a cloze test; children are asked to read a short passage and identify a missing key word orally. The task is discontinued when the child fails six items in a row. The publisher reports a median internal consistency reliability coefficient of .90. The Syntactic Similarities subtest of the Test of Reading Comprehension (TORC-3; Brown, Hammill, & Wiederholt, 1995) has 20 test items

and is designed to measure children's understanding of meaningfully similar, but syntactically different sentence structures. Children are asked to read five sentences and select the two that most closely convey the same meaning. The publisher reports a median internal consistency reliability coefficient of .92. Finally, for the Reading Comprehension subtest of the Gates MacGinitie Reading Tests (MacGinitie, MacGinitie, Dreyer, & Hughes, 2000), children are asked to read 13 short passages and answer multiple-choice questions about the passages; this is a timed 35-minute test. The publisher reports Kuder-Richardson Formula 20 reliability coefficients of .90-.92 for the fifth grade test.

Analytic Approach

Longitudinal Structural Equation Models (SEMs) of latent growth curves were used to develop a model of English reading comprehension. Specifically, we used *Mplus*, Version 4.2 (Muthén & Muthén, 2006) to arrive at a parsimonious model linking initial status (age 4.5) and growth rates (age 4.5 to 11) in children's vocabulary and word reading to English reading comprehension achievement at age 11. We first inspected the empirical growth plots of each child's vocabulary and word reading skills in each language and then tested the shape of the growth curve to determine the growth specification (i.e., linear or quadratic) that would be most appropriate for representing the individual developmental trajectories for children's English and Spanish vocabulary and word reading. We then proceeded to fit longitudinal SEMs with Spanish and English vocabulary and word reading initial status at age 4.5 and growth rates from age 4.5 to 11 as predictors of English reading comprehension at age 11.

The following parameters were of particular interest: English vocabulary intercept ($\beta_{\pi_0}^{EV}$), English vocabulary slope ($\beta_{\pi_1}^{EV}$), English word reading intercept ($\beta_{\pi_0}^{EW}$), and English word reading slope ($\beta_{\pi_1}^{EW}$) should all be statistically significant and positive; the covariance between English vocabulary intercept and English word reading intercept ($\psi_{\pi_0}^{EV\pi_0}^{EW}$) and between English vocabulary slope and English word reading slope should be statistically significant and positive ($\psi_{\pi_1}^{EV\pi_1}^{EW}$); and the covariance parameters between English vocabulary intercept and English vocabulary slope ($\psi_{\pi_0}^{EV\pi_1}^{EV}$) and between English word reading intercept and English word reading slope ($\psi_{\pi_0}^{EW\pi_1}^{EW}$) should also be significant, but the expected direction of this relationship was unclear. As previously noted, we hypothesized that Spanish vocabulary and Spanish word reading would not be significant predictors of English reading comprehension once the parallel English skills were accounted for. Standardized path coefficients are reported to assess the magnitude of each parameter of interest.

An examination of descriptive statistics (e.g., skewness, kurtosis) was conducted to ensure that the assumption of multivariate normality was not violated. All children had at least 3 of the 6 possible waves of data and we used the robust full information maximum likelihood estimator to analyze data on all 173 children with reading comprehension scores. The χ^2 goodness-of-fit test statistic, the comparative fit index (CFI), the Tucker-Lewis index (TLI), and the root mean squared error of approximation (RMSEA) were used to assess overall model fit, but individual component fits (the slopes, intercepts, and covariances for vocabulary and word reading) were of more substantive interest (Bollen & Curran, 2006; Byrne, 1998).

Preliminary Descriptive Analyses

Table 2 displays students' developmental and percentile scores on all measures across all time points (age 4.5 to 11). English word reading skills were within the average range (i.e., at or above the 31st percentile) at each time point whereas students' English productive vocabulary skills were below national norms across all time points. In Spanish, students' word reading skills hovered near national norms across all time points, but their productive vocabulary skills were consistently about two or more standard deviations (*SD*) below national norms. Finally, students' reading comprehension on all three measures was below the national average. English

reading comprehension was estimated as a latent construct comprised of the three measures and they loaded equally well (see Figure 1). The scale of the reading comprehension latent variable was determined by the WLPB-R Passage Comprehension subtest (Woodcock, 1991). Given that all three reading comprehension indicators had equally high reliability, the Passage Comprehension subtest was selected as the reference variable to facilitate interpretation of the latent reading comprehension score using WLPB W-score units by constraining the Passage Comprehension loading to 1.0 (Byrne, 1998).

The national English monolingual W-score for 11-year-olds is 503. However, the average latent English reading comprehension achievement for students in the sample at age 11 was 467, which is equivalent to being at a second grade level (about age 8); this difference in performance translates to a substantial effect size or gap of 1.63 *SD* (see Figure 2 for the observed gap in the average fitted comprehension performance of students in the sample, short dotted line, relative to national norms, long dotted line).

As expected, word reading and vocabulary skills were correlated from one occasion to the next, in both languages, with the magnitude of the correlations ranging from .5 to .9 ($p < .001$). However, the cross-language correlations present a somewhat more complicated story. At age 4.5, there was a low-moderate and negative relationship between students' English and Spanish vocabulary skills ($r = -.33$, $p < .001$), but the magnitude of the correlation decreased over time such that, by age 7, there was no longer a relationship. In contrast, there was a positive and consistently strong relationship ($r = .4$ -.6, $p < .001$, except at second grade when $r = .2$, $p < .001$) between students' word reading skills in both languages across all time points.

Results

We first present results for the longitudinal SEM of latent growth curves, interpreting the influence of vocabulary and word reading skills on reading comprehension using the standardized path coefficients. We then display the influence of these skills on the latent reading comprehension score in graphical form and estimate the effect size of each parameter of interest on the predicted latent reading comprehension score, holding the other predictors constant.

Results for the longitudinal SEM of latent growth curves revealed that the inclusion of the quadratic term improved model fit for Spanish vocabulary ($\Delta-2LL = 5.39$; $df = 1$, $p < .05$), English vocabulary ($\Delta-2LL = 159.13$; $df = 1$, $p < .001$), Spanish word reading ($\Delta-2LL = 9.16$; $df = 1$, $p < .001$), and English word reading growth ($\Delta-2LL = 307.32$; $df = 1$, $p < .001$). However, there was minimal variation in the rate of deceleration on both skills and in both languages. We thus simplified the model by treating the quadratic growth term as a fixed effect rather than a random effect. This strategy assumes that the quadratic term is constant across individuals, but allowed us to preserve the functional form for students' growth rates (Singer & Willett, 2003). We then proceeded to fit SEMs with initial status and growth rates in vocabulary and word reading skills as predictors of English reading comprehension at age 11.

As hypothesized, the Spanish vocabulary and word reading paths were not significant predictors of English reading comprehension, resulting in an all-English model of comprehension. Table 3 shows that, across all time points, word reading was more strongly associated with the English reading comprehension measures than vocabulary. As previously noted, English reading comprehension was estimated as a latent construct comprised of three measures that loaded equally well (see Figure 1). Although the overall model fit was not adequate, $\chi^2(94, N = 173) = 458.517$, $p < .001$, RMSEA = .15, CFI = .75, TFI = .72, individual components (i.e., the parameters of interest) were of more substantive interest as they drove our theoretical conceptualization of the hypothesized relationships. The parameters of interest were all statistically significant at the .05 level (i.e., structural weights greater than 1.96), with

88% of the variance in reading comprehension explained by the model. We added several constraints to the model for adequate overall fit, but the parameters of interest remained virtually unchanged (see Appendix A for details). Thus, we present and interpret results of the unconstrained model.

As hypothesized, the vocabulary and word reading intercepts and slopes were positive significant predictors of reading comprehension. The effect sizes for vocabulary intercept and slope were moderate and moderately-high ($r = .33$ and $.42$, respectively), with the vocabulary rate of growth having a slightly stronger influence on reading comprehension, compared to students' initial vocabulary level at age 4.5. Word reading (intercept and slope) had a stronger influence on reading comprehension than did vocabulary. In fact, the effect size of students' initial word reading level at age 4.5 was nearly 1, indicating that students who started out 1 *SD* above the average level on word reading are predicted to have reading comprehension scores that are 1 *SD* above the average. Word reading rate of growth also had a very large effect on reading comprehension ($r = .68$).

Figure 2 displays the influence of the four key parameters on the predicted latent English reading comprehension score by showing five prototypical reading comprehension scores for students with differing levels on each of the four parameters. The x-axis displays the five achievement levels, from 1 *SD* below the mean to 1 *SD* above the mean and the y-axis displays the predicted latent English reading comprehension score. As previously noted, when all parameters are at their mean, the average predicted reading comprehension score, demarcated by the horizontal small dotted line, is 467 (in W-score metric) and is equivalent to being at a second grade level. The strongest effect on reading comprehension is the word reading intercept, such that a student with initial word reading 1 *SD* below the mean (but with all other parameters held constant) is predicted to have a reading comprehension score of 456 while a student with initial word reading 1 *SD* above the mean (but with all other parameters held constant) is predicted to have a reading comprehension score of 476. However, even students who start out 1 *SD* above the mean on initial word reading have a predicted reading comprehension performance that falls more than 1 *SD* below national norms ($d = 1.37$).

The use of SEM of latent growth curves allowed us to examine the reciprocity among students' vocabulary and word reading skills. Specifically, we were able to investigate whether students who started out higher in vocabulary also started out higher in word reading and whether students with a faster rate of growth in vocabulary also had a faster rate of growth in word reading. As hypothesized, there was positive significant relationship for both, with the covariance between vocabulary and word reading initial status at age 4.5 being much larger ($r = .66$) than the covariance between vocabulary and word reading rate of growth ($r = .33$). Finally, as hypothesized, there was a significant relationship between students' initial status in vocabulary and word reading and their respective rates of growth, in a negative direction. For vocabulary, the effect size was very large ($r = -.82$), indicating that students who started out higher in vocabulary had a slower rate of growth in vocabulary, and students who started out higher in word reading had a slower word reading rate of growth ($r = -.51$).

Discussion

The results of this longitudinal study provide insight into the process of English reading comprehension for low achieving LM learners from low-income Spanish-speaking homes. Building upon research conducted with monolingual speakers (e.g., Catts et al., 2006; Johnston & Kirby, 2006; Vellutino et al., 2007) and emerging research with this particular population (Hoover & Gough, 1990; Nakamoto et al., 2008; Proctor et al., 2005, 2006), the investigation was focused on the contributions of initial status (age 4.5) and rate of growth (age 4.5 to 11) in word reading and vocabulary skills to reading comprehension outcomes at age 11. Not

surprisingly, both contributed to students' comprehension outcomes. However, although oral language is typically predicted to become the primary source of variability in reading comprehension for readers after the primary grades (e.g., Gough & Tunmer, 1986; Vellutino et al., 2007), in this study, word reading exerted a greater influence than vocabulary on comprehension outcomes at age 11. This same finding is reported by Nakamoto and colleagues (2008); in our study and theirs, the average reading comprehension performance among students was nearly 1 *SD* below national norms. These results suggest that the influence of word reading and oral language on reading comprehension outcomes depends on the text being processed. Expecting developmental shifts, over time, in the contributions of word reading and oral language skills to reading comprehension presumes that the reader has age-appropriate comprehension skills.

The fifth graders in this study were, on average, able to comprehend text at the second grade level. In contrast to word reading, which fell well within the average range, students' vocabulary skills not only plateaued by age 11 and ended up equivalent to those of an 8.5 to 9 year-old English monolingual speaker, but there was also less variation in these skills as compared to the variation in word reading skills. That is, students' oral language and reading comprehension skills were not only low, but also more restricted in range.

Of note, Jean and Geva (2009) similarly identified this profile of well-developed word reading skills and low vocabulary knowledge in a sample of fifth and sixth grade low-income LM learners from various language backgrounds, residing in Canada. In research with monolingual English speakers, the profile of adequate word reading skills and low language and comprehension skills is referred to as a specific comprehension deficit (e.g., Catts et al., 2006; Yuill & Oakhill, 1991) and only a relatively small percentage (estimates range from 5-15%) of monolingual students are estimated to show this profile. Further, this profile may not emerge in the early school grades as students tend to perform relatively well on comprehension measures during these years, probably because reading comprehension measures used during the early grades typically focus on the code rather than on language-based skills (see Shanahan et al., 2008). For example, in one study (Catts et al., 2005), the percentage of readers with this profile in the second grade (16%) nearly doubled in the fourth and eighth grades (about 30%) as fewer than half of the children met the criterion of poor reader at second grade.

The same may hold true for LM learner samples, even if they experience difficulties at higher rates. For instance, Nakamoto, Lindsey, and Manis (2007) found that the Spanish-speaking LM learners in their study had very low English vocabulary skills in first grade while their English word reading and English reading comprehension levels were well within the average range. However, beginning in third grade, their comprehension levels began to decrease relative to national norms (and their vocabulary levels remained low) while their word reading skills remained in the average range. Given that, relative to native English speakers, this profile is more prevalent among LM learner samples (for a review, see Lesaux, 2006), an important next step is to investigate whether LM learners' low language skills, and thus low comprehension outcomes, are rooted in their language and/or income status; this will require comparative research with samples of LM and native English speakers matched on socioeconomic status.

While struggling comprehenders are typically selected on the basis of their comprehension performance, reliably measured around third grade, the findings from this study suggest that it may be possible to identify poor comprehenders on the basis of this skill profile (low vocabulary and age-appropriate word reading), rather than waiting to assess reading comprehension. The use of SEM of latent growth curves revealed a strong positive relationship between students' initial word reading and vocabulary levels, and, albeit to a lesser degree,

also between their rates of growth in these component skills. But perhaps more importantly, there was a strong negative relationship between students' vocabulary at age 4.5 and their rates of growth in vocabulary from age 4.5 through age 11. For the LM students in this study, continued exposure to English with increasing years of schooling was not enough to accelerate their vocabulary growth and subsequent reading comprehension scores to age-appropriate levels. Our results strongly suggest that explicit, intensive instruction and learning opportunities—beginning as early as the preschool years—focused on developing vocabulary is necessary to advance students' vocabulary at levels commensurate with their word reading development. Moreover, this instruction cannot strictly take place during literacy and English language arts blocks; it must also be incorporated into content area teaching in order to attend to the vocabulary demands of the different subjects and the specialized language that each one carries with it.

Finally, as hypothesized, Spanish word reading and Spanish vocabulary skills did not contribute unique variance to English reading comprehension once parallel English skills were accounted for. Other work, even among bilingual, biliterate children (e.g., Manis, Lindsey, & Bailey, 2004; Nakamoto et al., 2008) converges with our finding regarding the predictive power of within-, as opposed to cross-, language effects for this particular population. The only exception is the work of Proctor and colleagues (2006) who found that Spanish vocabulary accounted for a very small amount of unique variance to English reading comprehension among their bilingually instructed sample. Given that our sample did not receive formal Spanish instruction, coupled with the reported shifts toward more English use in the home, the absence of cross-language effects is not surprising.

Implications

The findings of the present study have significant implications for practitioners and policymakers involved with meeting the needs of LM learners. In contrast to statistics showing that low-income immigrants, particularly Latinos, typically do not enroll their children in early childhood education (Takanishi, 2006), all students in this study attended preschool. In spite of this preschool experience, combined with the fact that they received all instruction in English, and that their family discourse increasingly included English, these fifth graders were reading in English at a second grade level. The characteristics of the schools they subsequently attended are precisely those associated with low reading achievement (Lutkus, Grigg, & Donahue, 2007): urban, Title I public schools with high concentrations of minority children, with over half of all students performing at low rates in reading and mathematics. Taken together, the picture is a dismal one with questionable future prospects for these learners, particularly since reading comprehension is relatively stable over time for low-income students (Snow, Porche, Tabors, & Harris, 2007), and since third grade reading is a strong predictor of high school completion rates (Christenson & Thurlow, 2004).

The profile of adequate word reading, but low vocabulary and, ultimately, reading comprehension skills for the sample studied highlights a mismatch between their needs and the instruction provided to them. The value of a precise match between instructional focus and a child's skills (i.e., individualized instruction rather than a one-size-fits-all approach) has been documented (Connor, Morrison, & Katch, 2004). For these students, there is a clear need for a concerted focus on explicit and sustained vocabulary instruction, in the service of their text comprehension skills. Unlike spoken interactions, which tend to be comprised of more basic vocabulary and language structures and which are highly contextualized such that listeners have multiple cues to draw from (e.g., gestures, tone), interactions with print are more decontextualized in nature. That is, written text provides minimal contextual cues, especially expository text, which is encountered in school regularly after the primary grades. Written text includes vocabulary that is more sophisticated, language structures that are more complex, and

assumes substantial background knowledge, which is intimately interrelated with vocabulary knowledge (e.g., Marzano, 2004). As previously noted, because students are expected to effectively learn from text, particularly in the content areas, the need for vocabulary instruction to also be integrated into content area learning is underscored.

Although the scope of vocabulary instructional research with LM learners is relatively sparse (Calderon et al., 2005; Carlo et al., 2004; Perez, 1981; Ramirez, 1986; Vaughn-Shavuo, 1990), there are established principles to guide this instruction. First, it should focus on explicit instruction of high-utility, general purpose academic words (e.g., Beck, McKeown, & Kucan, 2002; Biemiller & Slonim, 2001)—words that students are likely to encounter relatively frequently in text, often abstract in nature (e.g., *cause*, *effect*, *impact*, *representation*). Some of the instructional strategies purported to support this vocabulary knowledge development include working on word definitions, focusing on the multiple meanings of many words, and practice using the words across different written and oral contexts (for extended discussion see Beck, et al., 2002; Stahl & Nagy, 2006). Further, because exposure to English may be largely confined to the regular school day for LM learners and because it is not possible to teach all the words needed for text comprehension, this explicit instruction in word knowledge must be coupled with instruction to promote students' word learning strategies (Graves, 2006; Nagy & Scott, 2000). The documented practices for promoting students' word-learning skills include focusing on developing students' morphological skills—the ability to breakdown and transform words into their meaningful parts—and also developing their ability to use context to determine the meaning of an unfamiliar word encountered while reading (e.g., Baumann, Edwards, Bolland, Olejnik, & Kame'enui, 2003; Carlo et al., 2004). Our findings suggest that explicit vocabulary support is particularly essential for these learners as, despite age-appropriate ability to decode words, LM learners' low vocabulary levels limit their ability to make meaning from the text they read and in turn limit their ability to gain vocabulary and world knowledge via independent reading. In turn, alongside explicit vocabulary instruction, LM learners must be provided with opportunities to read independently with appropriate and manageable text to amass the word and world knowledge necessary to comprehend increasingly sophisticated text.

Limitations and Future Research

When considering the conclusions of this study as it relates to understanding the reading comprehension development of Spanish-speaking LM learners, it is important to consider the specific demographics of the participating children. This study focused on the large and growing population of LM learners from low-income homes who are struggling readers; in turn, generalizations about LM learners' reading development must be restricted to this specific population (for a discussion of the relationship between income and literacy rates, see National Research Council, 1998). Additionally, the sample was limited to one geographic region of the U.S.—a region where English-only instruction predominates and where communities are generally English-speaking. Studies that include more heterogeneous samples of LM learners, including those who are native speakers of languages other than Spanish, students who have had formal opportunities to develop their native language and literacy skills, as well as students who reside in enclaves that operate on the native language would shed further light on questions about English reading comprehension outcomes as they relate to second language acquisition.

Because the language gap starts early and quickly widens over time, placing a limit on successful text comprehension, it is essential for prek-12 educators and policymakers to ensure that language development becomes a non-negotiable part of LM learners' regular school day. Similarly, researchers must continue to develop a nuanced understanding of the role of language in reading comprehension and in turn, its effective instruction. Without access to word meanings, LM learners will continue to struggle to comprehend text and, in turn, their

likelihood of successfully completing high school will be compromised (e.g., Alliance for Excellent Education), limiting their educational and employment opportunities.

Acknowledgments

This research was supported by Grant No. 2 P01 HD-39530-06 awarded by the National Institute of Child Health and Human Development to Nonie K. Lesaux (PI) and by the Harvard Graduate School of Education Edmonds-Cheng Fellowship awarded to Jeannette Mancilla-Martinez. Patton Tabors and Mariela Paez directed the first phase of this study, from 2001-2005. We thank Lynn Catarius, Sylvia Spencer, Michelle Hastings, Armida Lizarraga, and Laura Cowherd for their partnership and assistance with data collection. Finally, this research would not have been possible without the participating families and their children.

Appendix A

To improve overall fit, the following constraints were added to the model: the curvature for word reading was influenced by word reading at wave 6 (age 11), the residuals were allowed to correlate for word reading at waves 3 and 4 (age 6 and 7), waves 4 and 5 (age 7 and 8), waves 1 and 6 (age 4.5 and 11), the residuals were allowed to correlate for vocabulary at waves 2 and 3 (age 5 and 6) and waves 4 and 5 (age 7 and 8), and finally the residuals were allowed to correlate for word reading and vocabulary at wave 4 (age 7). This resulted in an improved and adequate overall model fit, χ^2 (88, N = 173) = 209.354, $p < .001$, RMSEA = .09, CFI = .92, TFI = .90). Most importantly, however, the effects of the parameters of interest (both unstandardized and standardized) remained virtually unchanged. The effect sizes were as follows: vocabulary intercept = .32, vocabulary slope = .40, word reading intercept = .97 and word reading slope = .74. Given that the interpretation of the parameters would remain unchanged, we opted to present and interpret results for the more parsimonious model without these added constraints.

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Figure 1.

Structural Equation Model of latent growth curves representing the influence of English vocabulary (ev1-ev6) and English word reading (ew1-ew6) initial status (age 4.5) and growth rates (age 4.5-11) on English latent reading comprehension achievement at age 11.

Figure 2.

Prototypical starting points for English vocabulary intercept, English vocabulary slope, English word reading intercept, and English word reading slope and their predicted English latent reading comprehension scores, holding the other parameters at their mean.

Table 1

Demographic Characteristics of Participating Children and their Mothers (n = 168).

	Percent (%)
Child Country of Birth	
<i>United States</i>	89
<i>Puerto Rico</i>	4
<i>Dominican Republic</i>	2
<i>Colombia</i>	1
<i>Peru</i>	1
<i>Cuba</i>	<1
<i>El Salvador</i>	<1
<i>Guatemala</i>	<1
<i>Mexico</i>	<1
<i>Other Latin American Country</i>	1
Child Ethnicity	
<i>Latino</i>	97
<i>White</i>	1
<i>Other/Unknown/Mixed</i>	2
Mother Country of Birth	
<i>United States</i>	11
<i>Puerto Rico</i>	14
<i>Dominican Republic</i>	33
<i>Colombia</i>	4
<i>Peru</i>	4
<i>Cuba</i>	1
<i>El Salvador</i>	16
<i>Guatemala</i>	7
<i>Mexico</i>	3
<i>Other Latin American Country</i>	7
Maternal Education ^a	
<i>Less than High School</i>	36
<i>High School</i>	33
<i>Beyond High School</i>	31
Family Economic Condition ^b	
<i>Deep Poverty</i>	23
<i>Poverty</i>	29
<i>Near Poverty</i>	23
<i>Low-Income</i>	13
<i>Middle-Income</i>	12

^a Maternal education percentages as reported at study entry, but this did not change at follow-up.^b Economic condition percentages as calculated based on study entry data, but this did not change at follow-up.

Table 2

Sample Means on Productive Vocabulary, Word Reading, and Reading Comprehension Measures by Wave, with Sample Standard Deviations in Parentheses.

Measure	English			Spanish		
	N	Developmental Score	Percentiles	N	Developmental Score	Percentiles
Productive Vocabulary						
Age 4.5	144	430.2 (19.5)	11.1 (18.9)	147	424.5 (16.3)	6.1 (12.2)
Age 5	166	436.6 (18.0)	11.5 (17.9)	166	427.1 (16.6)	5.0 (11.5)
Age 6	154	450.1 (16.1)	15.1 (21.2)	153	431.1 (18.5)	4.8 (14.3)
Age 7	147	462.3 (16.1)	20.8 (23.3)	146	438.3 (21.7)	6.5 (17.9)
Age 8	144	472.0 (15.7)	25.3 (26.7)	138	459.5 (29.9)	22.9 (26.3)
Age 11	173	490.9 (10.3)	21.8 (19.3)	173	455.4 (28.1)	5.6 (13.3)
Word Reading						
Age 4.5	144	356.5 (15.5)	30.55 (21.2)	146	353.8 (11.3)	25.9 (16.9)
Age 5	166	364.6 (18.4)	31.39 (25.0)	166	355.9 (12.1)	19.4 (17.0)
Age 6	154	399.8 (20.7)	44.35 (27.8)	153	375.6 (32.8)	18.7 (27.5)
Age 7	147	437.5 (26.2)	56.71 (30.0)	146	406.0 (49.9)	28.2 (36.4)
Age 8	144	467.6 (21.2)	58.06 (29.2)	138	431.1 (57.1)	30.6 (38.4)
Age 11	173	500.6 (18.2)	51.18 (27.7)	173	471.7 (42.9)	29.6 (35.9)
Reading Comprehension Age 11						
WLPB-R Passage Comprehension	173	494.5 (13.7)	40.1 (22.6)	n/a	n/a	n/a
TORC-3 Syntactic Similarities	173	n/a	33.2 (25.4)	n/a	n/a	n/a
Gates MacGinitie Reading Comprehension	173	474.9 (32.5)	24.4 (22.4)	n/a	n/a	n/a

Implied Correlations among the Variables (English Picture Vocabulary, English Word Reading, and English reading Comprehension) in the Final Model.

Table 3

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1. Picture Vocabulary Age 4.5	—														
2. Picture Vocabulary Age 5	.89	—													
3. Picture Vocabulary Age 6	.69	.71	—												
4. Picture Vocabulary Age 7	.57	.67	.76	—											
5. Picture Vocabulary Age 8	.51	.53	.66	.69	—										
6. Picture Vocabulary Age 11	.50	.49	.63	.67	.62	—									
7. Letter-Word ID Age 4.5	.46	.44	.50	.50	.47	.44	—								
8. Letter-Word ID Age 5	.44	.45	.49	.43	.42	.33	.80	—							
9. Letter-Word ID Age 6	.33	.38	.43	.48	.51	.37	.57	.62	—						
10. Letter-Word ID Age 7	.25	.30	.37	.49	.43	.34	.44	.46	.70	—					
11. Letter-Word ID Age 8	.31	.38	.42	.46	.47	.35	.48	.50	.62	.79	—				
12. Letter-Word ID Age 11	.21	.21	.22	.27	.28	.29	.33	.24	.36	.48	.72	—			
13. Passage Comp Age 11	.32	.29	.32	.35	.43	.41	.42	.39	.46	.47	.58	.58	—		
14. Syntactic Similarities Age 11	.22	.24	.28	.25	.36	.33	.39	.43	.38	.42	.48	.42	.48	—	
15. Gates Reading Comp Age 11	.19	.21	.26	.26	.28	.40	.34	.37	.37	.48	.57	.57	.53	.51	—

Note. All coefficients are significant at $p < .05$, and coefficients of .22 or higher are significant at $p < .01$.