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

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This longitudinal study examined the process of English reading comprehension at age 11 years for 173 low-achieving Spanish-speaking children. The influence of growth rates, from early childhood (age 4.5 years) to pre-adolescence (age 11 years), in vocabulary and word reading skills on this complex process were evaluated with structural equation modeling. Standardized measures of word reading accuracy and productive vocabulary were administered annually, both in English and Spanish, and English reading comprehension measures were administered at age 11 years. 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.

Keywords: language minority learners, reading comprehension, longitudinal design

Native English speakers bring much to the process of learning to read; by about 6 years of age, 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; National Center for Education Statistics, 2007). For these language minority learners, school often represents the first formal encounter with the English language. Thus, language minority 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 language minority learners in the United States carry with them many 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 underresourced, low-performing schools with high concentrations of students of color (Capps et al., 2005; Consentino de Cohen, Deterding, & Chu Clewell, 2005). In the United States, 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 with 22% of their White classmates (National Center for Education Statistics, 2007). In addition, Latinos account for nearly half (46%) of all high school dropouts (Snyder, Dillow, & Hoffman, 2007).

The achievement gaps between monolingual and language minority learners are, indeed, well documented. However, in spite of the robust evidence—derived primarily from cross-sectional research—that language minority learners struggle academically, research has yet to longitudinally investigate the factors that influence the process of reading comprehension among Spanish-speaking language minority learners, especially for those who are struggling readers. Assessment of language minority 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 or 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 years) on students’ English reading comprehension achieve-
ment at 11 years of age, 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 multifaceted, involving the orchestration of many skills (e.g., RAND Reading Study Group, 2002). That is, the ability to comprehend text is dependent on, 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, such skills 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 language minority learners; unlike word reading skills, language minority 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, August, Carlo, & Snow, 2006; Proctor, Carlo, August, & Snow, 2005) have investigated reading comprehension for U.S. Spanish-speaking language minority 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 language minority learners’ reading outcomes.

Guided by the Simple View of Reading (Gough & Tunmer, 1986), these studies together 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 of Reading among their sample. Using a path model analysis, Proctor et al. (2005) similarly found that both language comprehension and word reading contributed to reading comprehension outcomes of their fourth-grade language minority learner sample. Most recently, Nakamoto et al. (2008) used structural equation modeling 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 language minority learners from low-income homes in the Netherlands, Droop and Verhoeven (2003) also used structural equation modeling, 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 et al., language comprehension became the more important predictor by the upper elementary years.

Whereas 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 language minority students’ reading comprehension performance (e.g., Garcia, 1991; Verhoeven, 1990). In fact, compared with monolingual speakers, listening comprehension tends to be more dependent on language minority learners’ vocabulary knowledge (Droop & Verhoeven, 2003). Further, even though language minority 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 on existing findings, to inform a model of comprehension for this population, and ultimately to inform effective instructional approaches to meet language minority learners’ academic needs.

The Present Study

This longitudinal study was designed to build on and advance research on language minority students’ reading comprehension, with a focus on the large population of Spanish-speaking learners from low-income homes who are struggling readers. Building on the studies reviewed above (Droop & Verhoeven, 2003; Hoover & Gough, 1990; Nakamoto et al., 2008; Proctor et al., 2005, 2006),
we focused on the contribution of word reading and vocabulary, over time, to reading comprehension outcomes, in a sample of Spanish-speaking language minority learners from low-income homes. Specifically, we investigated the extent to which not only initial status (i.e., intercept at age 4.5 years) but also rates of growth (i.e., slope from age 4.5 to 11 years) in English and Spanish word reading and vocabulary skills explain variation in English reading comprehension outcomes at 11 years of age. We focused 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 language minority 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 years of age. At study entry, participating children \(N = 387\) were enrolled in 14 Head Start programs and two public preschool programs in the northeastern United States and were followed from age 4.5 to 8 years (preschool through second grade). A total of 173 families were then recruited into the study at 11 years of age (fifth grade); together, these students attended 75 schools in the northeastern United States. 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) or 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 \(p < .05\)).

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 several 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 generated by the Development of Literacy in Spanish Speakers project and was prepared in Spanish and English. As shown in Table 1, the great majority of children were born in the United States, and nearly all parents identified their children as Latino. In contrast, the great majority of mothers were born outside the United States. Although there was some variation, more than one third of mothers had less than a high school education, and more than half of the 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%) received input exclusively in English at age 11. Similarly, parents reported a shift toward more English use by the children themselves over time; at 4.5 years of age, 45% used only or mostly Spanish at home with their families, compared with 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

<table>
<thead>
<tr>
<th>Table 1</th>
<th>Demographic Characteristics of Participating Children and Their Mothers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Characteristic</td>
<td>Percentage</td>
</tr>
<tr>
<td>Child’s country of birth</td>
<td></td>
</tr>
<tr>
<td>United States</td>
<td>89</td>
</tr>
<tr>
<td>Puerto Rico</td>
<td>4</td>
</tr>
<tr>
<td>Dominican Republic</td>
<td>2</td>
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<tr>
<td>Colombia</td>
<td>1</td>
</tr>
<tr>
<td>Peru</td>
<td>1</td>
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<tr>
<td>Cuba</td>
<td>&lt;1</td>
</tr>
<tr>
<td>El Salvador</td>
<td>&lt;1</td>
</tr>
<tr>
<td>Guatemala</td>
<td>&lt;1</td>
</tr>
<tr>
<td>Mexico</td>
<td>&lt;1</td>
</tr>
<tr>
<td>Other Latin American country</td>
<td>1</td>
</tr>
<tr>
<td>Child ethnicity</td>
<td></td>
</tr>
<tr>
<td>Latino</td>
<td>97</td>
</tr>
<tr>
<td>White</td>
<td>1</td>
</tr>
<tr>
<td>Other/unknown/mixed</td>
<td>2</td>
</tr>
<tr>
<td>Mother’s country of birth</td>
<td></td>
</tr>
<tr>
<td>United States</td>
<td>11</td>
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<td>Puerto Rico</td>
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<td>Dominican Republic</td>
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<td>Peru</td>
<td>4</td>
</tr>
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<td>El Salvador</td>
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<td>Guatemala</td>
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<td>Mexico</td>
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<tr>
<td>Other Latin American country</td>
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</tr>
<tr>
<td>Maternal educationa</td>
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<tr>
<td>Less than high school</td>
<td>36</td>
</tr>
<tr>
<td>High school</td>
<td>33</td>
</tr>
<tr>
<td>Beyond high school</td>
<td>31</td>
</tr>
<tr>
<td>Family economic conditionb</td>
<td></td>
</tr>
<tr>
<td>Deep poverty</td>
<td>23</td>
</tr>
<tr>
<td>Poverty</td>
<td>29</td>
</tr>
<tr>
<td>Near poverty</td>
<td>23</td>
</tr>
<tr>
<td>Low-income</td>
<td>13</td>
</tr>
<tr>
<td>Middle-income</td>
<td>12</td>
</tr>
</tbody>
</table>

Note: \(N = 168\).  

*a Maternal education percentages as reported at study entry, which did not change at follow-up.  
*b Economic condition percentages as calculated on the basis of study entry data, which did not change at follow-up.
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 categories 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, community libraries, or afterschool programs. Children received a $10 gift card to thank them for their participation.

Measures

We administered standardized measures of children’s language and reading. 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 would improve performance on the test given in the other language. English reading comprehension, assessed at age 11, was estimated as a latent construct composed 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). On this measure, 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 misses 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 keyword orally. The task is discontinued when the child fails six consecutive items. The publisher reports a median internal consistency reliability coefficient of .90. The Syntactic Similarities subtest of the Test of Reading Comprehension, Third Edition (TORC-3; Brown, Hammill, & Wiederholt, 1995) contains 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, Fourth Edition (MacGinitie, MacGinitie, Maria, Dreyer, & Hughes, 2000), children are asked to read 13 short passages and answer multiple-choice questions about the passages; this is a timed 35-min test. The publisher reports Kuder–Richardson formula 20 reliability coefficients of .90–.92 for the fifth-grade test.

Analytic Approach

Longitudinal structural equation models 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 years) and growth rates (ages 4.5 to 11 years) in children’s vocabulary and word reading to English reading comprehension achievement at 11 years of age. 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 structural equation models with Spanish and English vocabulary and word reading initial status at age 4.5 years and growth rates from age 4.5 to 11 years as predictors of English reading comprehension at 11 years of age.

The following parameters were of particular interest: English vocabulary intercept $\beta_{0}^{V}$, English vocabulary slope $\beta_{1}^{V}$, English word reading intercept $\beta_{0}^{W}$, and English word reading slope $\beta_{1}^{W}$ should all be statistically significant and positive; the covariance between English vocabulary intercept and English word reading intercept $\psi_{0}^{V}$, and between English vocabulary slope and English word reading slope $\psi_{1}^{W}$ 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.

We conducted an examination of descriptive statistics (e.g., skewness, kurtosis) to ensure that the assumption of multivariate normality was not violated. All children had at least three of the six 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 chi-square goodness-of-fit test statistic, the comparative fit index (CFI), the Tucker–Lewis index (TLI), and the root mean square 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 years). 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 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 composed 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, we selected the Passage Comprehension subtest as the reference variable to facilitate interpretation of the latent reading comprehension score using WLPB-R 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 years 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 standard deviations (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 years, 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 7 years of age, there was no longer a relationship. In contrast, there was a positive and consistently strong relationship between students’ word reading skills in both languages across all time points (r = .46, p < .001, except at second grade when r = .20, p < .001).

**Results**

We first present results for the longitudinal structural equation model 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 structural equation model of latent growth curves revealed that the inclusion of the quadratic term improved model fit for Spanish vocabulary (Δ−2LL = 5.39, df = 1, p < .05), English vocabulary (Δ−2LL = 159.13, df = 1, p < .001), Spanish word reading (Δ−2LL = 9.16, df = 1, p < .001), and English word reading growth (Δ−2LL = 307.32, df = 1, p < .001), where Δ−2LL represents the change in negative two times the log likelihood. However, there was minimal variation in the rate of deceleration on both skills and in both languages. We thus

<table>
<thead>
<tr>
<th>Measure/Age (years)</th>
<th>English</th>
<th>Spanish</th>
</tr>
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<tbody>
<tr>
<td></td>
<td>n</td>
<td>Developmental score</td>
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<tr>
<td>WLPB-R Productive Vocabulary</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age 4.5</td>
<td>144</td>
<td>430.2 (19.5)</td>
</tr>
<tr>
<td>Age 5</td>
<td>166</td>
<td>436.6 (18.0)</td>
</tr>
<tr>
<td>Age 6</td>
<td>154</td>
<td>450.1 (16.1)</td>
</tr>
<tr>
<td>Age 7</td>
<td>147</td>
<td>462.3 (16.1)</td>
</tr>
<tr>
<td>Age 8</td>
<td>144</td>
<td>472.0 (15.7)</td>
</tr>
<tr>
<td>Age 11</td>
<td>173</td>
<td>490.9 (10.3)</td>
</tr>
<tr>
<td>WLPB-R Word reading</td>
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<tr>
<td>Age 4.5</td>
<td>144</td>
<td>356.5 (15.5)</td>
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<tr>
<td>Age 5</td>
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<td>364.6 (18.4)</td>
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<tr>
<td>Age 6</td>
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<td>399.8 (20.7)</td>
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<tr>
<td>Age 7</td>
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<td>Age 8</td>
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<td>467.6 (21.2)</td>
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<td>Age 11</td>
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<td>Reading comprehension at age 11</td>
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<td>WLPB-R Passage Comprehension</td>
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<td>494.5 (13.7)</td>
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<td>TORC-3 Syntactic Similarities</td>
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<td>Gates–MacGinitie Reading Comprehension</td>
<td>173</td>
<td></td>
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</tbody>
</table>

Note. WLPB-R = Woodcock Language Proficiency Battery—Revised; TORC-3 = Test of Reading Comprehension, Third Edition.
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 structural equation models with initial status and growth rates in vocabulary and word reading skills as predictors of English reading comprehension at age 11 years.

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 with vocabulary. As previously noted, English reading comprehension was estimated as a latent construct composed of three measures that loaded equally well (see Figure 1). Although the overall model fit was not adequate, $\chi^2(94, N = 173) = 458.52$, $p < .001$, 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 $p < .05$ 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 the Appendix for details). Thus, we present and interpret results of the unconstrained model.

As hypothesized, the vocabulary and word reading intercepts 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 with students’ initial vocabulary level at age 4.5 years. Word reading (intercept and slope) had

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 years) and growth rates (ages 4.5–11 years) on English latent reading comprehension achievement at age 11 years. Vocab = Vocabulary; EV = English Vocabulary; Word Rd = Word Reading; EW = English word reading; WLPB-R = Woodcock Language Proficiency Battery—Revised; TORC-3 = Test of Reading Comprehension, Third Edition; e = error. See text of the Analytic Approach section for further description of the model.
a stronger influence on reading comprehension than did vocabu-
lar y. In fact, the effect size of students’ initial word reading level
at age 4.5 years 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 aver-
age. 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 En-
glish reading comprehension score. As previously noted, when all
parameters are at their mean, the average predicted reading com-
prehension score, demarcated by the horizontal small dotted line,
is 467 (in W-score metric) and is equivalent to 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, whereas
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 structural equation modeling 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 relation-
ship for both, with the covariance between vocabulary and word
reading initial status at age 4.5 years 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 lan-
guage minority learners from low-income Spanish-speaking homes. Building on 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 years) and rate of growth (age 4.5 to 11 years) in word reading and vocabulary skills to reading comprehension outcomes at age 11 years. Not surprisingly, both predictors 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 did vocabulary on comprehension outcomes at 11 years of age. This same finding was reported by Nakamoto et al. (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 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 with 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 language minority learners from various language backgrounds, residing in Canada. In research with monolingual English speakers, the profile of adequate word reading skills and low-level 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% to ~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 National Early Literacy Panel, 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 language minority learner samples, even if they experience difficulties at higher rates. For instance, Nakamoto, Lindsey, and Manis (2007) found that the Spanish-speaking language minority learners in their study had very low English vocabulary skills in first grade, whereas 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 learning patterns of native English speakers, this profile is more prevalent among language minority learner samples (for a review, see Lesaux, 2006), an important next step is to investigate whether language minority 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 language minority and native English speakers matched on socioeconomic status.

Table 3
Implied Correlations Among the Variables (English Picture Vocabulary, English Word Reading, and English Reading Comprehension) in the Final Model

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<td>13. WLPB-R Productive Vocabulary, Age 11</td>
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Note. WLPB-R = Woodcock Language Proficiency Battery—Revised; TORC-3 = Test of Reading Comprehension, Third Edition.
*p < .05. **p < .01.
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 structural equation modeling of latent growth curves revealed a strong positive relationship between students’ initial word reading and vocabulary levels, and, albeit to a lesser degree, between their rates of growth in these component skills. Perhaps more importantly, however, there was a strong negative relationship between students’ vocabulary at age 4.5 years and their rates of growth in vocabulary from age 4.5 through age 11 years. For the language minority 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 take place strictly 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 et al. (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 policy makers involved with meeting the needs of language minority 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 had attended preschool. In spite of this preschool experience, in combination with the fact that these fifth-grade students received all instruction in English and their family discourse increasingly included English, the students 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 having 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 as reading comprehension is relatively stable over time for low-income students (Snow, Porche, Tabors, & Harris, 2007) and given that 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 the students’ 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 composed of more basic vocabulary and language structures and which are highly contextualized such that listeners have multiple cues from which to draw (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, involves 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 to also integrate vocabulary instruction into content area learning is underscored.

Although the scope of vocabulary instructional research with language minority learners is relatively sparse (Calderón et al., 2005; Carlo et al., 2004; Perez, 1981; Ramirez, 1986; Vaughn-Shavuot, 1990), principles have been established 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 & Slovin, 2001)—words that students are likely to encounter relatively frequently in text that are 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 language minority learners and because it is not possible to teach all of 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 break down and transform words into their meaningful parts—and developing their ability to use context to determine the meaning of an unfamiliar word encountered while reading (e.g., Bauman, Edwards, Boland, 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, language minority 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 through independent reading. In turn, alongside explicit vocabulary instruction, language minority 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 language minority learners, it is important to consider the specific demographics of the participating children. This study focused on the large and growing population of language minority learners from low-income homes who are struggling readers; in turn, generalizations about language minority 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 United States—a region where English-only instruction predominates and where communities are generally English speaking. Studies that include more heterogeneous samples of language minority 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, and 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 prekindergarten through twelfth-grade educators and policy makers to ensure that language development becomes a non-negotiable role of language in reading comprehension and, in turn, its effective instruction. Without access to word meanings, language minority learners will continue to struggle to comprehend text, which, in turn, will compromise their likelihood of successfully completing high school, consequently limiting their educational and employment opportunities (e.g., Alliance for Excellent Education).

References


Johnston, T. C., & Kirby, J. R. (2006). The contribution of naming speed


### Appendix

#### Model Fit

To improve overall fit, the following constraints were added to the proposed structural equation model: The curvature for word reading was influenced by word reading at Wave 6 (age 11 years), the residuals were allowed to correlate for word reading at Waves 3 and 4 (ages 6 and 7 years), Waves 4 and 5 (ages 7 and 8 years), Waves 1 and 6 (ages 4.5 and 11 years), the residuals were allowed to correlate for vocabulary at Waves 4 and 5 (ages 5 and 6 years) and Waves 4 and 5 (ages 7 and 8 years), and finally the residuals were allowed to correlate for word reading and vocabulary at Wave 4 (age 7 years). This resulted in an improved and adequate overall model fit, $\chi^2(88, N = 173) = 209.354$, $p < .001$, 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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