

Abstract

The development of reading skills in language minority (LM) learners, particularly during the middle school years, remains unclear despite the increasing need for educators to serve this rapidly growing population. In this study, the English reading comprehension growth of middle school LM learners was investigated using a longitudinal design and the Simple View of Reading as a theoretical framework. Students were assessed at four time points between fifth and seventh grades on standardized measures of listening comprehension, word reading, and reading comprehension. Individual growth modeling revealed that both listening comprehension and word reading assessed in fifth grade predicted the elevation of students' developmental trajectories in reading comprehension. However, neither skill predicted students' growth in reading comprehension, and there was no significant variation across children in growth rates, indicating that students in seventh grade remained on a trajectory established in fifth grade. The implications of the slowing rate of reading comprehension development during the middle school years are discussed.

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Keywords: language minority learners; reading comprehension; adolescent learners; longitudinal design

Investigating English Reading Comprehension Growth in Adolescent Language Minority Learners: Some Insights from the Simple View

The ability to acquire knowledge from sophisticated text is central to accessing the curriculum and to achieving success in all academic subjects in middle and high school. Despite the large and increasing number of school-age children who come from non-native English speaking homes, known as Language Minority (LM) learners, it has been challenging to understand the reading performance of adolescent LM learners due to the limited scope of empirical work (for a review, see August & Shanahan, 2006). Among the nearly 11 million school-age LM learners, Spanish is the most common home language (Fry & Gonzales, 2008; NCES, 2007). Unlike most of their parents, Spanish-speaking LM learners are predominantly U.S.-born and typically received schooling in the U.S. since kindergarten entry (Fry & Gonzales, 2008; Hernandez, Denton, & Macartney, 2008). Further, in part due to recent national trends, the great majority of these learners have received their education in English-only instructional contexts.

However, studies that investigate the process of English reading development among Spanish-speaking LM learners remain lacking, especially during the middle school years when the demands of reading and extracting meaning from text increase (e.g., Bailey, 2007; Fang, 2008; Gandara & Rumberger, 2002; Scarcella, 2003; Snow & Uccelli, 2009). To our knowledge, there are no longitudinal studies that investigate Spanish-speaking LM learners' reading comprehension growth following students into the middle school years. This paucity in research effectively limits our understanding of what constitutes normative reading comprehension development in this growing population. Studies of this kind have the potential to inform our knowledge of reading trajectories during adolescence, a period in which explicit

reading instruction is not common but when academic learning demands rely on comprehension of texts read independently.

The well-known Simple View of Reading (Gough & Tunmer, 1986) provides a foundational conceptual framework for understanding the essential domains that contribute to the process of reading comprehension. Specifically, this parsimonious model holds that linguistic comprehension and word reading performance both play central roles in successful reading comprehension, with limitations in either skill compromising comprehension. The model has been widely supported empirically in research with monolingual speakers. In contrast, few studies (Hoover & Gough, 1990; Nakamoto, Lindsey, & Manis, 2008; Proctor, Carlo, August, & Snow, 2005) have empirically tested the Simple View with Spanish-speaking LM learners, and none have focused on LM learners in middle school.

The present longitudinal study was designed to advance our understanding of the process of reading comprehension development among Spanish-speaking adolescent LM learners in two ways. First, we sought to determine what constitutes normative growth in English reading comprehension for this population during the middle school years. Second, we investigated the extent to which listening comprehension and word reading, the two domains highlighted by the Simple View of Reading, predicted students' initial level and rate of growth in reading comprehension.

Normative English Reading Development

Understanding reading comprehension as a process that develops over time requires a longitudinal perspective that directly investigates the nature of individuals' growth trajectories in this skill. Although comparing older and younger or more skilled and less skilled readers can address many questions about reading *achievement*, these approaches do not provide adequate

answers to questions about students' *growth* in reading, such as whether some students grow at greater rates than others or whether rates of growth change over time as students transition into different developmental periods. Collecting longitudinal data on a cohort of learners is thus important for understanding reading as a developmental process and particularly essential for studies of LM learners, which can be especially susceptible to cohort effects when the students included are only a subset of LM learners with a temporary *limited English proficient* identification or when immigration patterns lead to differences in cohorts. Although there are some studies that have collected such data on LM learners in the U.S. (e.g., Hoover & Gough, 1990; Manis, Lindsey, & Bailey, 2004; Nakamoto et al., 2008) and in Canada (e.g., Chiappe & Siegel, 2006; Lesaux & Siegel, 2003), few studies have described the shape and rate of individual growth trajectories directly. By employing auto-regression or concurrent regression analyses, researchers have addressed questions about achievement levels at different periods and about stability in the rank-order of students. However, they have not yet taken advantage of the opportunity offered by longitudinal data to investigate growth directly.

Longitudinal research that has followed native English speakers from childhood through adolescence and used a growth modeling perspective has demonstrated that rates of growth in reading slow over time in a quadratic pattern. For instance, Francis, Shaywitz, Stuebing, Shaywitz, and Fletcher (1996) found that after initial rapid linear growth during childhood years, students reached a plateau in reading achievement (measured as a composite of real word reading, pseudo-word reading, and passage comprehension) around age 15 (grade 9). Catts, Bridges, Little, and Tomblin (2008) also examined the reading achievement growth, from childhood to adolescence, of a large sample of monolingual English children with language impairments and children with typical language. Although Catts and colleagues found growth in

reading comprehension (measured as a latent construct) to be linear, after high initial acceleration, both groups showed slower growth between fourth and eighth/tenth grade, which the authors assert is consistent with the quadratic growth pattern reported by Francis and colleagues.

Two recent studies using growth modeling found similar patterns for LM learners in the U.S. (Author, 2008; Nakamoto, Lindsey, & Manis, 2007). Nakamoto and colleagues (2007) investigated normative English reading comprehension development among Spanish-speaking LM learners followed from first through sixth grade. The authors reported linear growth in reading comprehension through second grade, with a substantially slower rate of growth by grade five. Author (2007) investigated similar questions with data on a large, nationally representative sample of students followed from kindergarten through fifth grade drawn from the Early Childhood Longitudinal Study-Kindergarten Cohort. Comparing individual growth trajectories in reading of native English speakers with those of LM learners who entered kindergarten with limited English, he found that growth slowed over time for both groups, but that the growth rate for these LM learners slowed substantially more than the growth rate for native English speakers, yielding widening achievement gaps between the two groups. The latter two studies raise the possibility that LM learners reach a plateau in reading development earlier than the ninth-grade plateau for native English speakers identified by Francis and colleagues. However, answering this question is not possible in the absence of longitudinal studies that follow LM learners beyond the elementary school years.

The Simple View of Reading and Language Minority Learners

The Simple View provides a parsimonious conceptualization of reading organized into two main components: linguistic comprehension and word decoding. Difficulties in either can

impede reading comprehension—the ultimate goal of reading. Limited language skills contribute to compromised reading comprehension; for instance when students lack understanding of individual word meanings or fail to parse the syntactic structure of sentences. Similarly, impaired word reading can interfere with students' comprehension when words are misidentified or identified with substantial effort, leaving fewer cognitive resources to process meaning. The Simple View has been used as a theoretical framework for numerous studies with monolingual English speakers, primarily in the elementary school years (e.g., Byrne & Fielding-Barnsley, 1995; Catts, Adlof, & Weismer, 2006; Catts, Hogan, & Adlof, 2005; Cutting & Scarborough, 2006; Johnston & Kirby, 2006; Joshi & Aaron, 2000; Savage, 2006; Savage & Wolforth, 2007; Tunmer & Hoover, 1992; Vellutino, Tunmer, Jaccard & Chen, 2007). Findings point to the prominent roles of both linguistic comprehension and word decoding in predicting comprehension outcomes, with linguistic comprehension skills found to be better predictors of older students' (e.g., adolescents) reading outcomes than word reading skills (e.g., Catts et al., 2005; Vellutino et al., 2007).

Converging evidence from the few studies conducted with LM learners and those conducted with monolingual English speakers supports the notion that both linguistic comprehension and word decoding contribute to comprehension outcomes. Hoover and Gough (1990) studied bilingual students in first through fourth grade; via regression analyses at each grade level, they found support for the Simple View. Proctor and colleagues (2005) used a path model analysis and similarly found that both linguistic comprehension and word reading contributed to reading comprehension outcomes in their fourth grade LM learner sample. Finally, and most recently, Nakamoto and colleagues (2008) used structural equation modeling to investigate the association between third grade language and word reading latent variables and

sixth grade reading comprehension, in both Spanish and English; their results also provide support for the Simple View. However, in the two studies to report achievement levels (Nakamoto et al., 2008; Proctor et al., 2005), both samples were selected on the basis of having received special services for English learning (i.e., bilingual or English-as-a-second-language instructional support); as a result, both samples demonstrated depressed levels of linguistic and reading comprehension and consequently a restricted range of variation in these skills. Thus, there is a need for research testing the Simple View with LM learners that include the entire range of variation in skills demonstrated by LM learners.

Furthermore, none of the studies conducted with LM learners to date have used longitudinal data and modern advances in growth modeling to investigate these relationships over time. Growth modeling offers two substantial advantages over the methods used by the previous research. First, by using multiple waves of data to estimate the true elevations and true slopes (i.e., rate of growth) in individual growth trajectories, researchers can account for the measurement error that confounds estimates at a single point in time; thus, the relationships among word reading, linguistic comprehension, and reading comprehension are not negatively biased (attenuated) by measurement error, which is particularly important given that word reading tends to be easier than linguistic comprehension to measure reliably. Second, by explicitly modeling students' rates of growth, researchers can investigate whether word reading and/or linguistic comprehension predict students' true rates of growth in reading comprehension. Further, because previous work suggests that LM learners' reading comprehension reaches a plateau during the middle school years (Author, 2008; Nakamoto et al., 2007), it is possible that LM learners' linguistic comprehension and word reading skills may influence not only levels but also rates of growth in reading comprehension. Specifically, we hypothesized that students who

struggle with word reading, linguistic comprehension, or both would demonstrate slower reading comprehension growth.

Present Study

The present study investigates the shape and elevation of normative growth trajectories in reading comprehension among Spanish-speaking LM learners with heterogeneous achievement in the middle grades and tests the extent to which the predictors of reading comprehension suggested by the Simple View of Reading apply to this growing population of learners.

Specifically, we asked:

1. What is the average pattern of growth in Spanish-speaking LM learners' English reading comprehension from fifth through seventh grade?
2. To what extent do English linguistic comprehension and word reading skills predict students' true initial level (i.e., fifth grade) and true rate of growth in English reading comprehension, accounting for measurement error?

Method

Design and Participants

The data for this study were collected in a school in the Northeastern United States participating in an on-going study designed to improve middle school students' literacy outcomes. This urban K-8 public school serves a 91% Latino, 91% low-income population and is a Strategic Education Research Partnership (SERP) site. SERP develops long-term partnerships between researchers and districts, with the over-arching goals of solving urgent problems of practice while at the same time contributing to knowledge. Seventy-nine percent of the student body is language minority, with 46% designated as Limited English Proficient, and 8% special education.

All students in mainstream fifth grade classrooms ($n = 55$) were tested; students receiving special education services and those in self-contained classes for recent immigrants (i.e., students classified as Limited English Proficient) were excluded. Students were tested on a range of literacy measures at 4 time points: fall of their 5th grade year ($n = 55$), fall and spring of their 6th grade year ($n = 48$), and fall of their 7th grade year ($n = 43$). As expected, there was attrition across the four testing occasions, but no significant differences were found in the literacy performance of students that left after time one, fall of fifth grade (see Appendix A for details). Approximately half (44%) of the participating students were male, 89% were Latino, and 46% were formerly classified as Limited English Proficient.

Measures

Test of Word Reading Efficiency (TOWRE). Word reading was assessed individually using the Test of Word Reading Efficiency (TOWRE; Torgesen, Wagner & Rashotte, 1999). The Sight Word Efficiency subtest was used for analysis. This subtest assesses the number of real words a student can read in 45 seconds. Internal reliability is reported as .95 and scorer reliability as .99. The TOWRE was selected as a word reading measure due to time constraints for administration, and, more importantly, because reading fluency (i.e., rate and accuracy) plays an increasingly important role for middle school students, the population of interest in the study (e.g., Aaron et al., 1999; Johnson et al., 2006; Savage, 2006).

Group Reading Assessment and Diagnostic Evaluation (GRADE). Listening comprehension and reading comprehension were assessed using the Group Reading Assessment and Diagnostic Evaluation (GRADE) (Williams, 2002). The GRADE is an untimed group administered reading test that includes a listening comprehension subtest and three reading subtests (reading vocabulary, sentence comprehension, and passage comprehension). Level 5

Form A was used in the fall of students 5th grade year, Level 6 Form A was used in the fall of students 6th grade year, Level 6 Form B was used in the spring of their 6th grade year, and Level M Form A was used in the fall of their 7th grade year. Internal consistency reliability is reported as good across sub-tests and forms (with a range from .66 to .95). As reported in the technical report, the GRADE was found to correlate highly with two nationally standardized achievement tests, the *Iowa Test of Basic Skills* (ITBS) (Hoover, Dunbar, & Frisbie, 2001) and the *California Achievement Test* (CAT) (CTB/McGraw-Hill, 1992), providing evidence for concurrent validity (see Williams, 2001 for detailed validity information).

The Listening Comprehension subtest of the GRADE measures students' linguistic comprehension without printed cues. Thus, students listen to a sentence or pair of sentences that are read aloud by the test administrator and they select one of four pictures that best matches what was read aloud to them by the test administrator.

Reading Comprehension is a composite of three subtests: Reading Vocabulary, Sentence Comprehension, and Passage Comprehension. Reading Vocabulary measures students' vocabulary knowledge without the benefit of contextual clues. Students silently read a phrase or short sentence in which one of the words is printed in bold type and they select the appropriate meaning of the word from a list of 4-5 choices. Sentence Comprehension measures students' comprehension of a sentence as a whole thought or unit. Students silently read short sentences in which one of the words is missing (as indicated by a blank) and they then select the appropriate word from a list of 4-5 choices. Finally, Passage Comprehension measures students' comprehension skills with an extended passage. After silently reading a passage with one or more paragraphs, students answer 3-5 multiple choice questions about the passage.

Analytic Approach

To address the research questions, a taxonomy of multilevel models for change was fitted in the person-period dataset that contained the longitudinal data on all sampled children, using SAS PROC MIXED with maximum likelihood estimation. The multilevel model for change provides a powerful tool for addressing questions concerning systematic inter-individual differences in change over time in longitudinal data, even with occasional missing or incomplete data points for individual children (Singer & Willett, 2003). We modeled students' developmental trajectories in Reading Comprehension using a publisher-provided composite of sub-scores for sentence comprehension, passage comprehension, and reading vocabulary. We used the Growth Scale Value score (GSV), a developmental scale score provided by the publisher; this score is ideal for growth modeling because it has been vertically equated across test forms using Item Response Theory. Students' initial (i.e., fall of 5th grade) word reading skills and initial listening comprehension skills were used as predictors of the elevation and slope of these trajectories.

Preliminary inspection of empirical growth plots of each child's reading comprehension scores as a function of age suggested a curvilinear growth trajectory, in which growth slowed over time, consistent with previous studies of reading development (e.g., Francis et al., 1996; Author, 2008; Nakamoto et al., 2007). This suggested that a quadratic growth specification would be most appropriate for representing the individual developmental trajectories in Reading Comprehension. Thus, the hypothesized multilevel model for change, expressed in composite form is:

$$\text{READINGCOMP}_{ij} = \left(\begin{array}{l} \gamma_{00} + \gamma_{10}\text{CAGE}_{ij} + \gamma_{20}\text{CAGE}_{ij}^2 \\ + \gamma_{01}\text{LISTCOMP}_i + \gamma_{11}\text{LISTCOMP}_i\text{CAGE}_{ij} + \gamma_{21}\text{LISTCOMP}_i\text{CAGE}_{ij}^2 \\ + \gamma_{02}\text{WORDRDG}_i + \gamma_{12}\text{WORDRDG}_i\text{CAGE}_{ij} + \gamma_{22}\text{WORDRDG}_i\text{CAGE}_{ij}^2 \end{array} \right) + \zeta_i + \varepsilon_{ij}$$

where $\varepsilon_{ij} \sim N(0, \sigma_\varepsilon^2)$ and $\zeta_i \sim N(0, \sigma_\zeta^2)$

Where parameter γ_{00} represents the population average true initial (fall of 5th grade) status, parameter γ_{10} represents the population average true initial slope, and parameter γ_{20} represents the population average true acceleration. These parameters provide the answer to our first research question concerning the average pattern of growth. Parameters γ_{01} , γ_{11} , and γ_{21} represent the effects of fifth-grade Listening Comprehension on the initial status, initial slope, and acceleration of Reading Comprehension. Parameters γ_{02} , γ_{12} , and γ_{22} represent the effects of fifth-grade Word Reading on the initial status, initial slope, and acceleration of Reading Comprehension. The significance and magnitude of the estimates for these six parameters provide the answer to our second research question concerning the effects of Listening Comprehension and Word Reading on level and growth in Reading Comprehension. As suggested by Singer & Willett (2003), the likelihood ratio test was used as the primary criterion for evaluating the statistical significance of an effect, although the Akaike information criteria and Bayesian information criteria are also provided as additional indicator of goodness of fit.

The random effect ε_{ij} is a level-1 residual for child i at time j and is assumed to be drawn from a normal distribution with mean of 0 and unknown variance σ_ε^2 . The random effect ζ_i is a level-2 (or individual level) residual for the intercept. It is hypothesized to be drawn from a normal distribution with a mean of zero, unknown variances σ_ζ^2 . Fitting a series of unconditional growth models with different variance component structures indicated that there

was no statistically significant variation in the linear or quadratic terms for age; for this reason, random effects for these terms were not included in the multi-level models, thereby fixing the initial slope and curvature across individuals.

Results

Descriptive Analyses

As shown in Table 1, the performance of students in the sample was in the average range on all standardized measures across each of the four waves. Students' standard scores are near or on par with national norms in Reading Comprehension and Word Reading in each grade. However, students' Listening Comprehension performance fell about half a standard deviation below the national mean in the fall of 5th and 6th grade, but was closer to national mean scores in later years. The Reading Comprehension GSV scores indicate that students improved in reading proficiency across the years studied. On average, students improved in reading between the fall of fifth grade and the fall of sixth grade by approximately 15 GSV points (slightly higher than the expected growth of 9 points, based on national norms). Students also improved in reading proficiency between the fall and spring of sixth grade by 3 GSV points (lower than the expected growth of 6 points). However, they demonstrated a slight decline (4 GSV points) between spring of sixth grade and fall of seventh grade (compared to an expected increase of 3 points during this period).

<Insert Table 1>

Average Pattern of Growth in Reading Comprehension

A set of multilevel models for change was fitted to describe the average pattern of growth in reading comprehension over this period (see Table 2). As hypothesized, average growth in Reading Comprehension was found to be curvilinear, with a positive initial true rate of growth of

approximately 2.13 GSV points per month and a true rate of acceleration of approximately -.04 points a month per month, indicating a slowing rate of growth over time (as evidence by the first likelihood ratio test in Table 2). Given this substantial slowing trend, by seventh grade, the rate of growth is approximately .3 GSV points per month, or 1/7 of the initial rate of growth.

However, it is worth noting that this slowing trend was also demonstrated by the norming sample, suggesting that many native English-speaking students also demonstrate slow growth during the middle school years. Thus, the slowing rate of growth for reading comprehension appears to be independent of language status when considering native English-speakers and LM students in the middle school years.

<Insert Table 2>

Predicting Reading Comprehension Level and Growth

A set of multilevel models was then fitted to address the question of whether initial (5th grade) levels of Listening Comprehension and Word Reading predicted the true initial (5th grade) status and/or rate of change in Reading Comprehension between fifth and seventh grade, based on the Simple View model. True initial status in Reading Comprehension was found to be predicted by both initial Listening Comprehension ($\Delta-2LL = 9.4$; $p < .0001$) and initial Word Reading ($\Delta-2LL = 31.4$; $p < .0001$), as evidenced by the parameter estimates under Model 3 in Table 2, as well as the second and third likelihood ratio tests listed. Examining the standardized parameter estimates in Table 2 reveals that Word Reading was found to have a larger effect than Listening Comprehension on the elevation of Reading Comprehension trajectory; the former effect has nearly twice the magnitude of the latter effect. Neither Listening Comprehension nor Word Reading was found to be a statistically significant predictor of true initial rate of growth or true rate of acceleration in reading (all p 's $> .05$). Figure 1 displays fitted growth trajectories for

prototypical students with above-average (1 standard deviation above the sample mean), below-average (1 standard deviation below the sample mean), and average values for initial Word Reading and for prototypical students with corresponding values for initial Listening Comprehension. Notice that, although the shape of the five fitted trajectories is identical such that they follow parallel paths, the elevation of the trajectories is quite different; the trajectories for students with above-average and below-average Word Reading are much further from the average trajectory than students with above-average or below-average Listening Comprehension.

<Insert Figure 1>

Discussion

As the first study to document normative English reading comprehension development and to test the Simple View of Reading (SVR) among middle school Spanish-speaking language minority (LM) learners, the findings extend previous work in this area to this population and developmental period. Convergent with studies of native English speakers (Catts et al., 2008; Francis et al., 1996) and elementary-school-aged LM learners (Author, 2008; Nakamoto et al., 2008), results of the present study demonstrate that growth in reading comprehension among middle school LM learners slowed over time. Specifically, by 7th grade, the rate of growth was only 1/7 of the initial rate of growth measured at 5th grade. This slowing rate of growth is consistent with the trend observed in the GRADE norming sample and suggests that growth in reading comprehension during the middle school years—among native English speakers and LM learners—is minimal for readers along the continuum of proficiency. Extending previous studies that investigated samples of LM learners that had been selected for special services, this study provides evidence that this trend occurs in naturally occurring samples of LM learners, including those across varying ability levels. For those LM learners performing within the average range,

this pattern of growth is not worrisome as it is consistent with expectations *and* these readers have appropriate skills for grade-level expectations.

However, for students with low reading comprehension achievement levels in fifth grade, the slowing rate of growth during the middle school years raises serious concerns. Our results showed that the rates of growth in reading comprehension did not vary across student ability level, such that students with initially low performance remained on a depressed and slowing trajectory through seventh grade. Thus, these students suffer from consistently insufficient reading comprehension skills during this critical developmental period in which expectations for reading to learn content are high and increasing. Additionally, students' ability to access grade-level material is limited by a slowing growth curve and a developmental plateau in skill development, such that their skills are stymied at inadequately low levels, preventing them from catching up with their peers. This finding suggests that the instruction students, particularly at-risk readers, receive in middle school is insufficient for supporting reading comprehension growth and underscores the need to test students' responsiveness to intervention at the point when their growth begins to slow, in this case before they enter the middle grade years.

The Simple View

We were able to explain differences in students' initial (i.e., fall of 5th grade) reading comprehension status, as expected based on the Simple View of Reading (SVR). Both listening comprehension and word reading skills contributed significantly to students' reading comprehension outcomes, thus validating the SVR for this group of learners. More surprisingly, we found that word reading exerted a greater effect than listening comprehension in explaining differences in LM students' reading comprehension performance. This finding is in contrast to studies of monolingual adolescents for whom linguistic comprehension serves as a better

predictor of reading comprehension than word reading in the middle school years (e.g., Catts et al., 2005; Vellutino et al., 2007). One potential explanation for the current unexpected finding is that the reading comprehension of adolescent LM learners may parallel earlier developmental periods (i.e., when word reading skills predominate), rather than that of age-matched monolingual speakers. A continued investigation into the reading performance of LM learners following students into the high school years would offer one way to test this hypothesis. Another potential approach to understanding these findings is that LM learners may have more exposure, formally in school and informally (e.g., radio, peer groups), to oral language rather than written language in English. By examining the quantity of exposure and quality of language input (receptive) and output (expressive) that LM learners experience in English, the effect of language modality exposure and reading comprehension skills can be addressed.

The conflicting findings between the SVR elements for different reader groups highlight the issue of how one operationalizes linguistic comprehension with the SVR model, a concern raised by Sadoski and Paivio (2007) and others. This issue is especially important given that listening comprehension measures have predominantly been used as the proxy for linguistic comprehension (e.g., in Hoover & Gough, 1990); it is possible that our findings on this question would have been different with a different measure of linguistic comprehension. We suspect that adolescent LM readers have generally attained adequate knowledge of the basic language structures (i.e., of the syntactic relationships among words) as our measure of listening comprehension seemed to largely tap into students' syntactic knowledge (Author, 2007). To address this gap in assessment measures, future studies would benefit from the use of an oral vocabulary measure that taps into other aspects of semantic knowledge in addition to syntactic skills.

Limitations and Future Research

The longitudinal nature of our study allowed us to explain differences in students' initial (i.e., fall of 5th grade) reading status, but limited variation in growth over the period studied provided us with only limited ability to predict growth in reading. Considering the limited scope of reading research with adolescents in general and LM learners in particular, additional studies with larger samples of LM learners followed longitudinally for an extended period of time are needed. Further, and as previously noted, an oral vocabulary measure would likely help to shed light on the relative effects of word reading and language skills on reading comprehension. That said, many of the abstract, academic terms on a vocabulary measure appropriate for middle school students would be difficult to measure with the oral tasks based on identifying pictures currently available, such as the Peabody Picture Vocabulary Test (Dunn & Dunn, 1997). Similarly, future studies should consider using and comparing several word reading measures, including both timed and untimed measures as well as word and nonword reading measures to investigate how their contributions differ.

Additionally, a comparison monolingual English sample would inform our understanding of the impact of the reader group characteristics on construct relationships. At present, it is unclear the extent to which the differences in findings from research conducted with LM learners and native English speakers are due primarily to language background and/or are due to differences in socio-economic background and educational experiences between the samples of LM learners and samples of native English speakers investigated. Another important consideration for future research is an investigation of the dynamic between LM learners' native and second language literacy skills through the adolescent years in explaining students' English reading performance. In the present study, students' native language (i.e., Spanish) literacy skills

were not examined and thus we could not determine the impact of students' native language literacy skills on their English reading performance, nor potential interaction effects. However, given the prevalence of English-only instruction in the U.S. due in part to legislation in the 1990's, the vast majority of LM learners, like those in our study, have likely not received instruction in their native language and thus cannot be reasonably expected to have developed native-language literacy skills. Overall, much potential remains to more thoroughly explore the developmental trajectories of reading comprehension for LM learners from the perspective of socio-economic status, native language contributions and interactions, and other educational, linguistic, and social factors.

Conclusion

Although further research is clearly needed, these findings provide reason to believe that looking beyond the elementary school grades and beyond achievement levels to investigate adolescents' growth trajectories can yield important insights into the reading comprehension process for LM learners. The continued roles of both word reading and listening comprehension in students' reading comprehension levels at the end of elementary school and thus in the ultimate elevation of their trajectories through seventh grade reinforce the importance of these component skills. Ultimately, the consistently low elevation of many LM students' trajectories highlights the need for targeted intervention, while the slowing rate of reading comprehension development during the middle school years presents a unique challenge to educators seeking to advance the skills of adolescent learners.

Appendix A

Testing for differences in literacy performance between students who remained in the study from fall of 5th through fall of 7th grade and those who left after the fall of 5th grade.

		Remained in the Study (<i>n</i> = 43)	Left the Study (<i>n</i> = 12)	Bonferonni <i>p</i> -values
GRADE Total Reading GSV	Mean	443.77	456.08	0.96
	<i>SD</i>	20.57	27.73	
GRADE Listening Comprehension	Mean	13.13	14.25	1.00
	<i>SD</i>	2.26	2.05	
TOWRE Sight Word Reading	Mean	68.47	66.83	1.00
	<i>SD</i>	7.87	13.16	

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Table 1. *Sample Means on Reading Comprehension, Listening Comprehension, and Word Reading Measures by Wave, with Sample Standard Deviations in Parentheses.*

	<i>Reading Comprehension GSV</i>	<i>Reading Comprehension SS</i>	<i>Listening Comprehension SS</i>	<i>Word Reading SS</i>
Fall, 5th grade (<i>n</i> =55)	446.45 (22.63)	96.23 (11.32)	92.91 (15.64)	96.91 (9.06)
Fall, 6th grade (<i>n</i> =48)	461.63 (19.24)	99.34 (9.62)	92.97 (8.10)	98.25 (9.85)
Spring, 6th grade (<i>n</i> =48)	472.71 (22.31)	101.67 (11.15)	104.98 (11.46)	102.38 (10.54)
Fall, 7th grade (<i>n</i> =43)	468.95 (17.89)	98.48 (8.94)	94.94 (10.05)	---

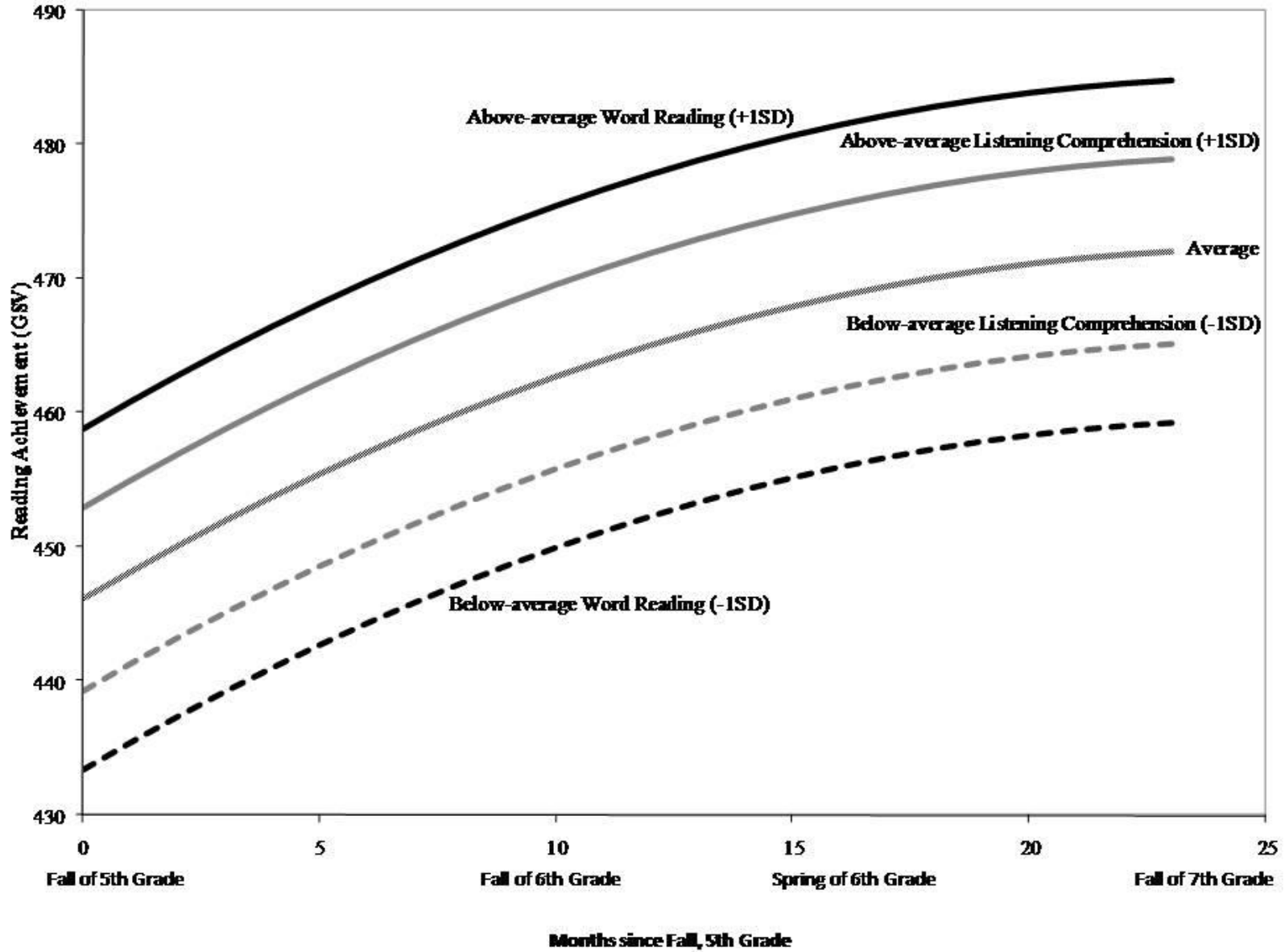
Note. Word reading was not assessed in the fall of 7th grade due to practical concerns about the interruption in instructional time necessary.

Table 2. Results of Multilevel Models for Change Predicting Reading Comprehension Developmental Score as a Function of Linear Age, Quadratic Age, Initial Listening Comprehension, and Initial Word Reading ($n = 55$).

			<i>M1</i>	<i>M2</i>	<i>M3</i>
<i>Fixed Effects</i>					
	Intercept	γ_{00}	447.79***	446.11***	310.54***
	Linear Age (months)	γ_{10}	1.2026***	2.1262***	2.0707***
	Quadratic Age (months per month)	γ_{20}		-0.04275**	-0.04104**
	5th Grade Listening Comprehension	γ_{01}			0.3032***
	5th Grade Word Reading	γ_{02}			0.5630***
<i>Variance Components</i>					
	Level 1: Within-person	σ_{ϵ}	106.89***	99.7595***	99.1588***
	Level 2: Between-person	σ_{ζ}	348.69***	349.18***	140.13***
<i>Goodness of Fit Statistics</i>					
	Deviance (-2LL)		1592.5	1582.7	1538.2
	AIC		1600.5	1592.7	1552.2
	BIC		1608.6	1602.7	1566.3
<i>Likelihood Ratio Tests</i>					
	H_0				
	$\gamma_{20} = 0$			9.8***	
	$\gamma_{01} = 0$				9.4***
	$\gamma_{02} = 0$				31.4***

Note. These are the standardized parameter estimates for listening comprehension and word reading.

Figure 1. Plots of fitted growth trajectories in total reading for prototypical cases with differing levels of initial listening comprehension and initial word reading ($n = 55$).



Caption. Fitted growth trajectories for prototypical students with above-average, below-average, and average values for initial Word Reading and initial Listening Comprehension.