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What is This?
Components and Context: Exploring Sources of Reading Difficulties for Language Minority Learners and Native English Speakers in Urban Schools

Michael J. Kieffer¹ and Rose K. Vukovic²

Abstract
Drawing on the cognitive and ecological domains within the componential model of reading, this longitudinal study explores heterogeneity in the sources of reading difficulties for language minority learners and native English speakers in urban schools. Students (N = 150) were followed from first through third grade and assessed annually on standardized English language and reading measures. Structural equation modeling was used to investigate the relative contributions of code-related and linguistic comprehension skills in first and second grade to third grade reading comprehension. Linguistic comprehension and the interaction between linguistic comprehension and code-related skills each explained substantial variation in reading comprehension. Among students with low reading comprehension, more than 80% demonstrated weaknesses in linguistic comprehension alone, whereas approximately 15% demonstrated weaknesses in both linguistic comprehension and code-related skills. Results were remarkably similar for the language minority learners and native English speakers, suggesting the importance of their shared socioeconomic backgrounds and schooling contexts.

Keywords
reading difficulties, language minority learners, oral language, longitudinal research

Growing evidence suggests that not all reading difficulties are alike (e.g., Aaron, Joshi, Gooden, & Bentum, 2008; Catts, Hogan, & Fey, 2003; Leach, Scarborough, & Rescorla, 2003; Lipka, Lesaux, & Siegel, 2006; Swanson, Howard, & Saez, 2006). In particular, numerous empirical studies have supported the simple view of reading (Gough & Tunmer, 1986) in suggesting that individual differences in reading can be explained to a substantial extent by the contributions and interaction between two partially independent constructs—linguistic comprehension and decoding. As a result, students with reading difficulties can demonstrate weaknesses on one or both of these cognitive components, leading to three skill profiles associated with reading difficulties: weaknesses in linguistic comprehension alone, weaknesses in decoding alone, and weaknesses in both linguistic comprehension and decoding.

Despite the power of the simple view for describing skill differences among students in the cognitive domain, it does not explicitly account for factors in other domains that contribute to success or struggles with reading. The componential model of reading, proposed by Aaron et al. (2008), thus improves on this characterization of reading difficulties by specifying two additional domains—the psychological domain (including components such as motivation, interest, locus of control, and other social–emotional characteristics) and the ecological domain (including the linguistic, socioeconomic, and schooling contexts in which students develop language and learn to read). Although studies have demonstrated predictive relations between individual components within these three domains and reading outcomes, researchers have only recently begun to investigate how these components interact across domains. It is thus less clear how ecological and psychological characteristics may relate to students’ cognitive reading profiles and thereby their reading proficiency. In particular, researchers have most often investigated...
the cognitive components of reading difficulties among native English speakers in suburban contexts, raising questions about ecological influences on reading, such as home language background, socioeconomic status, and urbanicity. Far less is known about the heterogeneity of reading difficulties of students from low-income backgrounds and among students who speak a primary language other than English at home, a population known as language minority (LM) learners (August & Shanahan, 2006).

The current study explores the cognitive and ecological domains specified by the componential model of reading by investigating the contributions of linguistic comprehension and code-related skills to reading comprehension for linguistically diverse children learning to read in urban schools. In particular, we compared the relative contributions of these two cognitive components for native English speakers and Spanish-speaking LM learners from similarly low-income backgrounds. We examined the extent to which the contributions of these components differ for the two groups as well as a related question: How prevalent are each of the three cognitive subtypes of reading difficulty among each group? By exploring these questions for students learning to read in the ecological context of urban schools with high concentrations of poverty, we aim to shed light on the nature of the reading difficulties commonly encountered by children in this understudied context.

**Linguistic Diversity and Reading Development**

In recent years, the linguistic diversity of the U.S. student population has grown dramatically. LM learners now represent nearly 11 million students in U.S. schools, with a large majority of these students coming from Spanish-speaking homes (Fry & Gonzales, 2008; National Center for Education Statistics [NCES], 2007). Spanish-speaking LM learners tend to be highly concentrated in urban schools with large numbers of students from low-income backgrounds and fewer resources than their suburban counterparts (e.g., Gándara, Rumberger, Maxwell-Jolly, & Callahan, 2003). Contrary to a popular conception of second-language learners in schools as recent immigrants, a majority of Spanish-speaking LM learners are U.S. born and have received schooling in the United States since kindergarten (Fry & Gonzales, 2008; Hernandez, Denton, & Macartney, 2008).

Evidence from national data sets indicates that LM learners in the United States are at substantially elevated risk for encountering reading difficulties by the end of the primary grades (e.g., Kieffer, 2008, 2010; NCES, 2009). For instance, a recent analysis of nationally representative data from the Early Childhood Longitudinal Study, Kindergarten Cohort indicates that approximately 27% of LM learners who enter kindergarten with limited English proficiency go on to encounter reading difficulties by the end of third grade, as opposed to only 9% of native English speakers (Kieffer, 2010). Despite increased recognition that LM learners are at substantial risk for reading difficulties, the sources of these difficulties are much less clearly understood (August & Shanahan, 2006).

Although many studies have found support for the simple view among native English speakers (e.g., Byrne & Fielding-Barnsley, 1995; Catts, Adlof, & Weismier, 2006; Catts et al., 2003; Catts, Hogan, & Adlof, 2005; Cutting & Scarborough, 2006; Johnston & Kirby, 2006; Joshi & Aaron, 2000; Savage, 2006; Savage & Wolkoff, 2007; Tunmer & Hoover, 1992; Vellutino, Tunmer, Jaccard, & Chen, 2007), only a few studies have investigated these questions for Spanish-speaking LM learners (Hoover & Gough, 1990; Lesaux, Crosson, Kieffer, & Pierce, 2010; Mancilla-Martinez, Kieffer, Biancarosa, Christodoulou, & Snow, 2009; Manis, Lindsey, & Bailey, 2004; Proctor, Carlo, August, & Snow, 2005). Findings from the latter studies generally support the notion that English linguistic comprehension and decoding each make unique contributions to English reading comprehension for Spanish-speaking LM learners at various grades. For instance, Hoover and Gough (1990) found strong support for the simple view with Spanish–English bilingual students in first through fourth grade. Similarly, Proctor and colleagues (2005), using path analysis, found that both linguistic comprehension and word reading contributed to reading comprehension in fourth grade LM learners. In a longitudinal study with Spanish-speaking LM learners, Mancilla-Martinez and colleagues (2009) found that both listening comprehension and word reading in fifth grade predicted students’ later levels, but not rates of growth, in reading comprehension through seventh grade. In another longitudinal study, Manis and colleagues (2004) found that both code-related prereading skills (e.g., print knowledge and phonological awareness) as well as expressive language in kindergarten and first grade predicted reading comprehension in second grade.

Although this evidence suggests that both linguistic comprehension and code-related skills are important to reading comprehension for Spanish-speaking LM learners, the relative contribution of each is less clear. In particular, there is reason to believe that linguistic comprehension may explain more of the variation in reading comprehension than code-related skills for LM learners in the primary grades and thus that many of the reading comprehension difficulties found among these learners may be the result of weaknesses in English linguistic comprehension. In a recent review, the National Literacy Panel on Language Minority Children and Youth found that LM learners, on average, reach similar levels of word reading accuracy as their native English-speaking peers, despite much lower levels of reading comprehension (Lesaux, 2006). This suggests that weaknesses in code-related skills may be found among LM learners at similar rates to those of their native English-speaking
counterparts and are unlikely to explain their high prevalence of difficulties with reading comprehension. At the same time, several studies have documented the relatively limited English vocabulary and listening comprehension levels of Spanish-speaking LM learners in the primary grades (e.g., Manis et al., 2004; Páez, Tabors, & López, 2007; Swanson, Saez, & Gerber, 2006), suggesting that weaknesses in linguistic comprehension may be a more prevalent source of difficulties.

In addition, there is some disagreement among researchers as to whether the contributions of decoding and linguistic comprehension are additive or multiplicative. Hoover and Gough (1990) found that reading comprehension is better explained by the product of these two components \( R = D \times C \) than by their sum \( R = D + C \). In a conceptual extension of the simple view, Chen and Vellutino (1997) argued that a model with both additive and multiplicative terms \( R = D + C + (D \times C) \) would better fit the data, which we argue can be justified on psychometric terms (see Note 1).

Either formulation predicts that the interaction between code-related skills and linguistic comprehension will explain more variation in reading comprehension than their unique effects alone. In contrast to this position, Savage (2006) found that the interaction between nonword decoding and listening comprehension did not explain additional significant variation, beyond the unique effects of each, in a sample of 15-year-olds with severe reading delays. Savage and Wolfforth (2007) found similar results for university students, many of whom had identified reading delays. Similarly, the studies conducted with LM learners since Hoover and Gough have either not investigated or not found evidence for a significant interaction between these components in predicting reading comprehension. The current study aims to address this issue by investigating whether the interaction between linguistic comprehension and code-related skills explains significant variation beyond the combination of the unique effects of each for LM learners and their native English-speaking classmates.

Although providing a solid foundation, the existing research on LM learners’ reading development has several additional limitations that are worth noting (August & Shanahan, 2006). One is the relative absence of longitudinal studies that investigate how early development of language and literacy skills predicts later reading comprehension. A second is that the longitudinal studies that have been conducted with this population (e.g., Lesaux et al., 2010; Mancilla-Martinez et al., 2009; Manis et al., 2004; Nakamoto, Lindsey, & Manis, 2007; Páez et al., 2007) have typically compared LM learners to national norms for monolinguals rather than to native English speakers attending the same schools. So it is unknown whether the weaknesses in linguistic comprehension found for LM learners, relative to norms, are specific to this population or are shared by their native English-speaking classmates, with whom they often share many educational experiences as well as socioeconomic characteristics. A third limitation is that the longitudinal studies that have compared LM learners and native English speakers who are matched in SES and sampled from the same schools (such as the foundational studies led by Siegel and colleagues; e.g., Chiappe, Siegel, & Wade-Woolley, 1999; Lesaux & Siegel, 2003; Lipka et al., 2006) did not include measures of vocabulary or listening comprehension. The current study was designed to address these limitations while building on the high-quality research to date.

### Ecological Influences of Socioeconomic Status and Urbanicity

Given that LM status is intertwined with other components that may influence reading development (August & Shanahan, 2006; Snow, Burns, & Griffin, 1998), investigating questions about home language background requires that researchers also attend to other ecological factors. Specifically, because LM learners in the United States are much more likely to be from low-income backgrounds and attend low-income schools, they may be more similar to their native English-speaking classmates than is commonly acknowledged. Research with nationally representative data sets does suggest that controlling for socioeconomic status at child and school levels does lead to more similar reading developmental trajectories (e.g., Kieffer, 2008, 2010; Reardon & Galindo, 2009), though such controls do not eliminate reading achievement differences in the primary grades. For instance, Kieffer (2010) found that LM learners who entered kindergarten with initially limited oral English proficiency had 4 times the odds of native English speakers of encountering reading difficulties by third grade; however, when socioeconomic status was taken into account, the LM learners’ odds of encountering difficulties dropped to 1.5 times those of native English speakers from similar socioeconomic backgrounds.

Although the effects of poverty on reading achievement are widely acknowledged, the extent to which they predict specific weaknesses in code-related and/or linguistic comprehension is less clear. The predominant focus of reading research on phonological awareness and early code-related reading skills (e.g., National Institute of Child Health and Human Development [NICHD], 2000) may have led to an assumption that these skills are the primary mechanism by which poverty influences reading outcomes. Indeed, there is a consensus among researchers that poverty is related to weaknesses in phonological awareness and is a risk factor for learning to decode (NICHD, 2000; Snow et al., 1998). However, there is also evidence that children from low-income homes are especially likely to demonstrate weaknesses in vocabulary and listening comprehension (e.g.,...
Hart & Risley, 1995; Storch & Whitehurst, 2002; Zill, Collins, West, & Hausken, 1995), raising questions about how prevalent comprehension-based reading difficulties may be in these learners. For instance, in a large longitudinal study, Storch and Whitehurst (2002) found that students recruited from Head Start classrooms demonstrated below-average levels on both oral language and decoding measures. A closer look at this sample’s performance reveals that the average Head Start student had somewhat more severe weaknesses in oral language than in decoding; in first and second grade, mean Peabody Picture Vocabulary Test levels were near the 25th percentile, whereas scores on Woodcock Word Attack and Wide Range Achievement Test Word Reading were closer to the 37th percentile. Although this discrepancy is much smaller than those found on similar measures for Spanish-speaking LM learners in the same grades (e.g., more than 50 percentile points in Manis et al., 2004), it does suggest the possibility that weaknesses in linguistic comprehension may be more prevalent among monolingual readers from low-income backgrounds than we might expect (Aaron, Joshi, & Williams, 1999).

In addition to socioeconomic status, the ecological characteristics of schooling contexts may influence the prevalence and characteristics of reading difficulties. Large school districts in urban centers are characterized by higher rates of reading difficulties than one can expect from their demographic characteristics alone; for instance, the most recent National Assessment of Educational Progress Trial Urban District Study found that among students eligible for free or reduced-price lunch, 55% in large-city districts scored below basic levels, compared with 49% in all public schools (NCES, 2009). Urban schools, particularly those serving linguistically diverse populations, are more likely to be staffed by unqualified or inexperienced teachers, to have weak instructional leadership, and to have limited materials resources (e.g., Gándara et al., 2003). Although these factors are likely to lead to higher proportions of students encountering reading difficulties in general, it is less clear to what extent they might lead to higher rates of code-related and/or comprehension-related difficulties. On one hand, implementing effective instruction in phonological awareness and phonics to prevent code-related difficulties requires high levels of teacher knowledge (e.g., Joshi et al., 2009; Moats, 2009), which may be in short supply among inexperienced or underprepared teachers in urban settings. On the other hand, efforts to improve early reading instruction in Title I schools, including but certainly not limited to Reading First, have focused heavily on improving instruction in code-related skills, so primary-grade teachers in urban schools may be better equipped to prevent code-related difficulties than they are to develop students’ linguistic comprehension. Although investigating questions of instructional quality is beyond the scope of the current study, a first step is describing the prevalence of code-related and comprehension-related weaknesses among students with low reading comprehension in urban contexts. By contrasting such results with those found among students from middle-class backgrounds in suburban contexts, the current study can generate hypotheses about the ecological influences of socioeconomic status and urbanicity.

**Present Study**

Drawing on the componential model of reading, the current study was designed to investigate the extent to which cognitive components and language background accounted for the English reading difficulties of linguistically diverse students from low-income backgrounds attending urban schools. By following students across the primary grades, we were able to explore how code-related and linguistic comprehension skills, as they are developed in first and second grade, predicted reading comprehension in third grade. We further investigated whether these relations differed for Spanish-speaking LM learners and native English speakers with similar socioeconomic background, sampled from the same educational context. In a related goal, we sought to describe the extent to which students who encountered reading difficulties by third grade demonstrated earlier weaknesses in linguistic comprehension and/or code-related skills and to shed light on the relative prevalence of distinct subtypes of reading difficulties among LM learners and native English speakers. The study was designed to ultimately inform better approaches to instruction in linguistically heterogeneous classrooms that can prevent and remediate reading difficulties by targeting students’ specific sources of difficulties. This study was guided by two related sets of research questions:

1. To what extent do code-related skills, linguistic comprehension skills, and their interaction in first and second grade make unique contributions to reading comprehension in third grade for linguistically diverse students from low-income backgrounds attending urban schools? To what extent are these contributions different for Spanish-speaking LM learners and their native English-speaking counterparts?

2. Among students with poor reading comprehension in third grade, how prevalent are three hypothesized subtypes of difficulties: weaknesses in linguistic comprehension alone, weaknesses in code-related skills alone, and weaknesses in both linguistic comprehension and code-related skills? Do Spanish-speaking LM learners with poor reading comprehension disproportionately demonstrate one of these subtypes, relative to their native English-speaking counterparts?
Method

Participants

The data in this study were collected as part of an ongoing longitudinal research project designed to examine the developmental course and cognitive predictors—including reading and language skills—of various mathematical abilities in a cohort of diverse students in an urban context. Study participants included 150 linguistically and ethnically diverse students attending two Title I elementary schools in New York City. The two schools reported using two different programs in Grades 1 to 3, both of which could be described as phonics based, with strong emphases on systematic and explicit instruction in phonological awareness and sound–symbol correspondences. Students were originally recruited in first grade and followed through second and third grade. On average, students were 6 years, 10 months old in Grade 1 (SD = 5 months); 7 years, 10 months old in Grade 2 (SD = 6 months); and 8 years, 11 months old in Grade 3 (SD = 6 months). Half of the participants were female (n = 75).

Of the 150 students in the sample, 64 were native English speakers, 63 were Spanish-speaking LM learners (see Note 2), and 23 did not have data on their language background. Data from the latter group contributed to the overall estimates for each research question but did not contribute to the questions concerning differential effects or prevalence by LM learner status. Overall, participating students were 35% African American, 63% Hispanic, and 2% Caucasian. Native English speakers were predominately African American (73%). The participants were overwhelmingly from low-income backgrounds; 88.7% of students in Grade 1 and 93.3% of students in Grade 2 received free or reduced-price lunch. The subsamples of Spanish-speaking LM learners and native English speakers were very closely matched in their socioeconomic status (i.e., in Grade 1, 88.9% of LM learners and 89.1% of native English speakers received free or reduced-price lunch; in Grade 2, 93.4% of LM learners and 92.9% of native English speakers did so). Chi-square tests confirmed that there were no significant differences in socioeconomic status by language background (all ps > .922).

There was some attrition from the cohort over time. Of the students originally recruited in Grade 1, 16 students (11% of the total sample) did not participate in Grades 2 and 3, whereas an additional 13 students (9%) participated in Grade 2 but not in Grade 3. In addition, the sample was refreshed in each of the two later grades, with 30 students (20%) joining the study in Grade 2 and 6 students (4%) joining the study in Grade 3. Excluding cases with incomplete data across the three testing occasion could lead to substantial bias in the estimates as well as reduced statistical power. Thus, all students who participated in at least one testing occasion were included in the analytic sample, and full information maximum likelihood (FIML) was used to account for missing data on individual variables (including the assessment measures and LM learner status). In FIML estimation, all available information is used to estimate the variance-covariance matrix, which then serves as the basis for fitting structural equation models; this approach has been shown recently in Monte Carlo studies to yield equal or superior results to other approaches to missing data (e.g., Enders & Bandalos, 2001).

Measures

Reading comprehension. We used the Gates–McGinitie Reading Comprehension Test (4th ed.; McGinitie, MacGinitie, Maria, & Dreyer, 2000). With this test, participants are provided 35 minutes to read 11 short passages and answer 48 multiple-choice questions related to the passages. At the third grade level, the passages are all selected from published books or periodicals and contain natural science, social science, and fictional content and are written in both narrative and nonnarrative modes. The publisher reports Kuder–Richardson Formula 20 reliability coefficients of .90 to .92 for the third grade test. Raw scores were converted into publisher-provided normal curve equivalent scores and then rescaled to have a mean of 100 and SD of 15; this linear transformation allowed scores on this measure to be comparable to those from the other measures without changing the shape of the sample distribution.

Code-related skills. We used the Woodcock–Johnson III Tests of Achievement Research Edition (WJ-III RE; Woodcock, McGrew, & Mather, 1999) Letter-Word Identification (LWID) test to assess word reading skills. With this test, children identify and pronounce isolated letters (e.g., g, r) and words of increasing difficulty (e.g., cat, palm). This task was administered in first and second grade; the publisher reports reliability between .96 and .98. To assess phonological skills, we used the Comprehensive Test of Phonological Processing (CTOPP) Elision test (Wagner, Torgesen, & Rashotte, 1999). This test measures the extent to which a child can say a word, then say what is left after dropping out designated sounds, including initial sounds and blends (e.g., “Say bold . . . now say bold without saying /b/.”) This task was administered in first and second grade; the publisher reports reliability between .89 and .92. CTOPP elision raw scores were converted into publisher-provided age-based standard scores (with a national mean of 10 and SD of 3) and then rescaled to have a mean of 100 and SD of 15; this linear transformation allowed scores on this measure to be comparable to those from the other measures without changing the shape of the sample distribution.

Linguistic comprehension. We used two tests from the WJ-III battery (Woodcock, McGrew, Schrank, & Mather, 2007), both administered in first and second grade: Picture Vocabulary, and Oral Comprehension. With Picture Vocabulary,
students identify pictured objects ranging from common to specialized (e.g., star, gavel). The publisher reports reliability between .70 and .73 for children in first and second grade. With Oral Comprehension, students listen to short passages and then supply the missing final word using syntactic and semantic cues (e.g., “Without a doubt, his novels are more complex than the novels of many other contemporary ______.”). The publisher reports reliability between .78 and .83 for children in first and second grade.

**Procedure**

Annual assessments of the children occurred in the winter. Children were individually assessed for all tasks except for reading comprehension, which was group administered in the children’s classrooms. Research assistants conducted the assessments in the schools. Research assistants completed an intensive 4-hr training workshop on standardized administration, which included demonstrating 100% accuracy during mock administrations. In addition, a school psychology doctoral student was present during data collection so that questions and coaching occurred where necessary throughout data collection.

**Data Analytic Approach**

Structural equation modeling (SEM) was used to address the research questions. SEM has several advantages over other approaches that were relevant to this study (Bollen, 1989). First, as noted above, SEM can be easily combined with FIML to account for missing data on individual indicators appropriately, which is useful for addressing the attrition that is endemic to longitudinal research. Second, confirmatory factor analysis (CFA) within the SEM framework offers a theoretically driven approach to create composites of multiple measures for a construct and to test whether the hypothesized constructs are independent, which was used in the current study to create and test a measurement model for linguistic comprehension and code-related skills. Third, SEM offers options for both structural regression paths and latent variable interactions, which were used in the current study to investigate the relative contributions of the linguistic comprehension and code-related skills factors to reading comprehension as well as their interactions with each other (i.e., D × C) and with LM learner status. Fourth, CFA can be used to yield factor scores for latent constructs that draw on multiple observed measures and have greater reliability and often broader construct representation than any single observed score, which was used in the present study to create factor scores for linguistic comprehension and code-related skills that could be used to cross-tabulate the prevalence of difficulties in one or both of these components.

**Results**

**Preliminary Analyses**

Prior to conducting SEM analyses to address the research questions, preliminary analyses were conducted to describe the reading and language skills of the entire sample and of students with low English reading comprehension, to investigate preliminary differences between the Spanish-speaking LM learners and native English speakers, to check normality assumptions, and to confirm the measurement model for the latent factors for linguistic comprehension and code-related skills. First, means on the reading and language measures were estimated for all students and for the subsamples of LM learners and native English speakers, after using FIML to account for missing data on individual variables. These results are displayed in the third, fourth, and fifth columns in Table 1. As shown in the third column, the average student in the sample had a profile that included age-appropriate phonological awareness and word recognition skills (i.e., near or above the nationally average standard score of 100) combined with underdeveloped vocabulary and oral comprehension (i.e., below a standard score of 90 or percentile rank of 25) across Grades 1 and 2. The average student in the sample also scored at the 25th percentile (standard score of 90) in reading comprehension in third grade. When means were estimated separately by language group, this pattern of well-developed word recognition and phonological awareness was found to hold for both LM learners and native English speakers. Similarly, both groups demonstrated below-average vocabulary and listening comprehension, although these weaknesses were more severe for LM learners than for native English speakers; LM learners scored more than 15 standard score points (i.e., 1 standard deviation) below the national mean consistently across the linguistic comprehension measures and in both grades, whereas native English speakers scored within 4 to 10 standard scores points of the mean. These differences in vocabulary and listening comprehension by language group were statistically significant, whereas the two language groups were not significantly different on the phonological awareness and letter-word identification measures (as indicated by the z statistics reported in the sixth column). In addition, the LM learners were significantly lower than the native English speakers in third grade reading comprehension (z = 2.45, p = .0143).

Next, to describe the average skill profile for students with low reading comprehension, means on each measure were estimated for those students scoring below the 25th percentile on Gates–MacGinitie Reading Comprehension in Grade 3 (n = 60), as shown in the seventh column of Table 1. Any such cut score in a continuous distribution of reading achievement is necessarily somewhat arbitrary and should not be interpreted as an absolute distinction between qualitative difference groups of students (Snow et al.,
Table 1. Estimated Means for Reading and Language Measures for All Students and for Students Scoring Below the 25th Percentile in Grade 3 Reading Comprehension, Overall and by Language Background, With Associated Tests for the Significance of Differences by Language Background, Based on Full-Information Maximum Likelihood Model

<table>
<thead>
<tr>
<th>Construct</th>
<th>Observed Indicator</th>
<th>All Students (N = 150)</th>
<th>Native English (n = 64)</th>
<th>Spanish-Speaking LM (n = 63)</th>
<th>Effect of Language Group (z statistic)</th>
<th>Students With Low Reading Comprehension (n = 60)</th>
<th>Native English (n = 19)</th>
<th>Spanish-Speaking LM (n = 33)</th>
<th>Effect of Language Group (z statistic)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Word recognition and phonological awareness</td>
<td>Grade 1 CTOPP Elision</td>
<td>Overall</td>
<td>97.45</td>
<td>100.53</td>
<td>95.28</td>
<td>1.319</td>
<td>93.06</td>
<td>96.64</td>
<td>93.64</td>
</tr>
<tr>
<td></td>
<td>Grade 2 CTOPP Elision</td>
<td></td>
<td>97.80</td>
<td>97.25</td>
<td>100.71</td>
<td>-0.817</td>
<td>95.04</td>
<td>95.00</td>
<td>97.12</td>
</tr>
<tr>
<td></td>
<td>Grade 1 WJ Letter-Word Identification</td>
<td></td>
<td>108.71</td>
<td>112.14</td>
<td>107.91</td>
<td>1.578</td>
<td>101.92</td>
<td>107.052</td>
<td>104.05</td>
</tr>
<tr>
<td></td>
<td>Grade 2 WJ Letter-Word Identification</td>
<td></td>
<td>104.30</td>
<td>107.31</td>
<td>102.78</td>
<td>1.871</td>
<td>99.84</td>
<td>102.58</td>
<td>99.15</td>
</tr>
<tr>
<td>Linguistic comprehension</td>
<td>Grade 1 WJ Picture Vocabulary</td>
<td></td>
<td>84.43</td>
<td>91.85</td>
<td>78.27</td>
<td>4.336***</td>
<td>76.05</td>
<td>85.16</td>
<td>79.91</td>
</tr>
<tr>
<td></td>
<td>Grade 2 WJ Picture Vocabulary</td>
<td></td>
<td>85.80</td>
<td>89.54</td>
<td>83.10</td>
<td>3.584***</td>
<td>81.15</td>
<td>85.74</td>
<td>79.73</td>
</tr>
<tr>
<td></td>
<td>Grade 1 WJ Oral Comprehension</td>
<td></td>
<td>89.06</td>
<td>95.95</td>
<td>84.29</td>
<td>3.853***</td>
<td>82.60</td>
<td>93.16</td>
<td>81.53</td>
</tr>
<tr>
<td></td>
<td>Grade 2 WJ Oral Comprehension</td>
<td></td>
<td>87.40</td>
<td>91.96</td>
<td>83.10</td>
<td>3.219***</td>
<td>80.95</td>
<td>88.26</td>
<td>78.15</td>
</tr>
<tr>
<td>Reading Comprehension</td>
<td>Grade 3 QM Passage Comprehension</td>
<td></td>
<td>90.00</td>
<td>93.66</td>
<td>88.16</td>
<td>2.45*</td>
<td>79.74</td>
<td>81.78</td>
<td>79.78</td>
</tr>
</tbody>
</table>

Note: LM = language minority; CTOPP = Comprehensive Test of Phonological Processing; WJ = Woodcock–Johnson III Tests of Achievement; GM = Gates–MacGinitie Reading Test.

*p < .05, **p < .01, ***p < .001.
1998). However, for the practical purposes of informing educators’ and policy makers’ efforts to identify how many and which students are struggling to meet grade-level expectations, choosing a heuristic cut score is often required. The 25th percentile cut score was selected because of its use in previous studies investigating reading difficulties and reading disabilities in first-language (see Lyon et al., 2001; Stanovich & Siegel, 1994) and second-language populations (e.g., Abub-Rabia & Siegel, 2002; Chiappe & Siegel, 1999; Da Fontoura & Siegel, 1995; Lipka et al., 2006; Wade-Woolley & Siegel, 1997; see Note 3). The average student with low third grade reading comprehension demonstrated a profile in Grades 1 and 2 of relatively well-developed word recognition and phonological awareness combined with substantially limited vocabulary and oral comprehension. As shown in the eighth and ninth columns of Table 1, this pattern was largely the same among students with low reading comprehension, whether they were native English speakers or Spanish-speaking LM learners. As in the overall sample, the LM learners with low reading comprehension were not significantly different from their native English-speaking counterparts in their phonological awareness or letter-word identification but demonstrated more severe weaknesses in vocabulary in Grade 2 and in oral comprehension in both grades. These findings suggest the extent to which sources of difficulties may be common across the two language groups, while raising questions about heterogeneity in sources of difficulties within each group.

In addition, preliminary analyses were conducted to investigate the normality of the sample distributions for the observed indicators. Based on Shapiro–Wilk tests of normality, there was little evidence of deviations of normality for the Grade 3 reading comprehension, Grade 2 picture vocabulary and letter-word identification, or Grade 1 oral comprehension and letter-word identification measures (ps > .200). However, there was some evidence of deviations from normality for Grade 1 and 2 phonological awareness, Grade 1 picture vocabulary, and Grade 2 oral comprehension (ps < .01). Given this, we fitted the SEM models of interest described below using both traditional maximum likelihood, which is sensitive to violations of normal theory assumptions, and maximum likelihood with robust standard errors (using the MLR option available within Mplus 4.2), which is robust to violations of multivariate normality. Results were identical across the two estimation methods, providing support that any deviations from normality in specific measures did not pose a threat to the validity of findings. There was also little evidence of outliers on the observed measures.

CFA was used to determine whether the eight observed indicators for component skills in Grades 1 and 2 could be appropriately summarized with theoretically driven composite constructs. Drawing on the simple view and componential model of reading and previous factor analysis informed by these models (e.g., Aaron et al., 1999; Lesaux et al., 2010), we hypothesized that students’ performance on the observed measures of picture vocabulary, oral comprehension, phonological awareness, and letter-word identification could be captured with two independent, but related, latent factors—a linguistic comprehension factor and a code-related skills factor. We further hypothesized that there would be a sufficiently high auto-correlation between students’ performance on each of the constituent indicators in Grade 1 and the corresponding indicator in Grade 2 that these could be combined together to form a single composite for students’ levels of each construct, averaged across the two grades (see Note 4). This hypothesized model fit the observed data adequately, as indicated by several absolute goodness-of-fit statistics (root mean square error of approximation = .076, comparative fix index = .965, Tucker–Lewis index = .949). The fitted CFA model is displayed in Figure 1. As shown, the two latent factors for the constructs of linguistic comprehension and code-related skills, the observed indicator for language group (represented by the box labeled LM) was included and allowed to correlate with each latent factor. As shown, each of the standardized loadings indicated a strong relationship between a latent factor and the observed indicator that was hypothesized to tap it; the loadings were all statistically significant. Although the two latent factors represented independent constructs, they were also strongly correlated (r = .73), as we would expect. LM learner status was associated with significantly lower linguistic comprehension but was not associated with differences in code-related skills, consistent with the mean comparisons on the observed indicators. It is also worth noting that the unstandardized loading for the relationship between the linguistic comprehension factor and Grade 2 WJ picture vocabulary as well as the unstandardized loading for the relationship between the code-related skills factor and Grade 2 WJ LWID were fixed to 1, which set the scale of the latent composites to approximate a standard score scale (i.e., a national mean of 100 and SD of 15). This allowed us to later extract factor scores for each student that were interpretable against approximate national benchmarks.

To confirm that this measurement model was appropriate and superior to other theoretically justifiable alternates, we compared this model to several others. Specifically, this two-factor model was found to have significantly better fit than a one-factor model in which all eight indicators tapped a single construct (Δχ² = 100.4, Δdf = 2, p < .0001). It also
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had no worse fit than a less parsimonious, three-factor model in which vocabulary and oral comprehension tapped unique constructs ($\Delta \chi^2 = 5.274$, $\Delta df = 3$, $p = .1528$). Similarly, we found little evidence that the CTOPP elision and WJ LWID measures tapped unique constructs in this sample; models in which these indicators tapped two unique constructs consistently encountered convergence problems. We also considered removing the CTOPP elision indicators altogether and allowing this factor to tap only the WJ LWID indicators. However, we had both theoretical and methodological reservations about such a step. On a theoretical level, we were concerned that a measure that tapped reading real words alone would not capture variability related to phonological decoding skills appropriately. On a methodological level, we were concerned that using only two indicators for this latent factor while using four indicators for the linguistic comprehension factor could yield composites that differ substantially in their reliability; because we were interested in the relative contributions of these two composites, differences in their reliability would be a threat to the validity of inferences about their relative predictive power.

Nonetheless, in addressing the first research question below, we confirmed that the substantive findings did not differ whether or not we chose to include CTOPP elision indicators in the composite for code-related skills.

**Relative Contributions to Reading Comprehension**

To address our first set of research questions, we fitted a sequence of SEM models in which third grade reading comprehension was regressed on the latent composites for linguistic comprehension and code-related skills across first and second grade. When included together as main effects, linguistic comprehension made a significant and substantial unique contribution to reading comprehension (standardized path coefficient = 0.60, $z = 4.214$, $p < .0001$), but code-related skills did not (standardized path coefficient = –0.01, $z = –0.065$, $p = .9482$). To test the simple view hypothesis that the interaction between code-related skills and linguistic comprehension (i.e., D × C) contributes to reading comprehension beyond the contribution of each

![Figure 1. Measurement model for code-related skills and linguistic comprehension latent factors based on eight observed indicators in Grades 1 and 2, as they related to language minority (LM) status, with associated standardized factor loadings and correlations. Note: $N = 150$. ***$p < .001$](image-url)
independently, we created a latent variable interaction between these two factors and a structural regression path between this interaction and third grade reading comprehension. We found that this interaction did, in fact, make a significant unique contribution to third grade reading comprehension (standardized path coefficient = 0.16, \(z = 2.307, p = .0205\)). The final fitted model is displayed in Figure 2, with statistically significant regression paths and covariances represented with thick black lines and nonsignificant paths and covariances represented with thin gray lines.

To determine whether the relative contributions of these components to third grade reading comprehension were different for LM learners and native English speakers, we tested a series of latent variable interactions between LM learner status and the component skill factors. None of the effects on reading comprehension were found to differ by LM learners status, including the main effect of code-related skills (\(z = –0.669, p = .5035\)), the main effect of linguistic comprehension (\(z = –0.901, p = .3676\)), and the interaction between code-related skills and linguistic comprehension (\(z = –1.889, p = .0589\)). As shown in Figure 2, there is also no significant main effect of LM learner status on third grade reading comprehension after controlling for the effects of code-related skills, linguistic comprehension, and their interaction (\(z = .270, p = .7872\)). This indicates that the association between LM learner status and third grade reading comprehension is completely mediated by the two cognitive components, suggesting that the elevated risk for third grade reading difficulties of LM learners previously noted can be explained entirely by their lower levels of English linguistic comprehension. All of these results based on the \(z\) statistic for individual paths of interest were confirmed by a likelihood ratio test comparing the goodness of fit for models with and without the path.
Prevalence of Code-Related and Linguistic Comprehension Difficulties

Our second research question concerned the prevalence of each of the three subtypes of reading difficulties hypothesized by the simple view among linguistically diverse students in urban schools. Specifically, using students’ scores on the latent factors for linguistic comprehension and code-related skills across Grades 1 and 2, we cross-tabulated the proportion of students who demonstrated weaknesses in linguistic comprehension alone, weaknesses in code-related skills alone, and weaknesses in both linguistic comprehension and code-related skills. We defined weaknesses as scoring below a factor score of 90; as noted above, the CFA model yielded factor scores on a scale that approximates the original standard scale of the observed standardized measures (i.e., a mean of 100 and SD of 15 relative to the national distribution). The proportions of students demonstrating each of these subtypes of difficulties were cross-tabulated for all students, for LM learners and native English speakers separately, for students with low third grade reading comprehension (i.e., below a standard score of 90), and for LM learners and native English speakers with low third grade reading comprehension.

The results for the cross-tabulated prevalence of weaknesses in code-related skills and linguistic comprehension are reported in Table 2. First, we examined results for all 150 students in the sample to shed light on the skill profiles that would be commonly found in primary grade classrooms in urban schools. Among all students, a majority (62% of students in the participating classrooms) demonstrated a profile of weak linguistic comprehension skills combined with average code-related skills, whereas a much smaller proportion of students (10.7% of the entire sample) demonstrated weaknesses in both linguistic comprehension and code-related skills. It is most striking that no student in
Table 2. Prevalence of Cognitive Component Profiles for the Entire Sample and the Subsample of Students With Low Third Grade Reading Comprehension, by Language Background

<table>
<thead>
<tr>
<th></th>
<th>Low Code-Related Skills Only</th>
<th>Low Linguistic Comprehension Only</th>
<th>Low in Both Code-Related Skills and Linguistic Comprehension</th>
<th>Low in Neither Code-Related Skills Nor Linguistic Comprehension</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>%</td>
<td>n</td>
<td>%</td>
<td>n</td>
</tr>
<tr>
<td>Entire sample</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>All students (N = 150)</td>
<td>0.0</td>
<td>0</td>
<td>62.0</td>
<td>93</td>
</tr>
<tr>
<td>LM learners (n = 63)</td>
<td>0.0</td>
<td>0</td>
<td>69.8</td>
<td>44</td>
</tr>
<tr>
<td>Native English (n = 64)</td>
<td>0.0</td>
<td>0</td>
<td>50.0</td>
<td>32</td>
</tr>
<tr>
<td>Unknown language status (n = 23)</td>
<td>0.0</td>
<td>0</td>
<td>73.9</td>
<td>17</td>
</tr>
<tr>
<td>Students with low reading comprehension</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Overall (n = 60)</td>
<td>0.0</td>
<td>0</td>
<td>81.7</td>
<td>49</td>
</tr>
<tr>
<td>LM learners (n = 33)</td>
<td>0.0</td>
<td>0</td>
<td>81.8</td>
<td>27</td>
</tr>
<tr>
<td>Native English (n = 19)</td>
<td>0.0</td>
<td>0</td>
<td>78.9</td>
<td>15</td>
</tr>
<tr>
<td>Unknown language status (n = 8)</td>
<td>0.0</td>
<td>0</td>
<td>87.5</td>
<td>7</td>
</tr>
</tbody>
</table>

Note: LM = language minority. Students were classified as low in reading comprehension if they received a standard score less than 90, that is, below the 25th percentile. Students were classified as low on a given component if their factor score for the component was less than 90, which is roughly equivalent to a standard score of 90 on national norms.

The sample demonstrated a profile of well-developed linguistic comprehension combined with weak code-related skills. When disaggregated by language background, the relative prevalence of subtypes appeared to be similar across LM learners and native English speakers. Across both groups, weaknesses in linguistic comprehension alone were the most common (69.8% for LM learners, 50.0% for native English speakers), and weaknesses in both linguistic comprehension and code-related skills were rarer (14.3% for LM learners, 6.3% for native English). Results were also similar for the small number of participating students for whom we did not have data on language background. To illustrate these results, we plotted students’ factor scores for linguistic comprehension against their scores for code-related skills; Figure 3 displays the scatterplot for all students on these two dimensions, with LM status represented by the plotting symbol and the cut score for weaknesses on each dimension indicated by a thick black line. As shown, the majority of participants fell in the bottom-right quadrant, corresponding to a specific weakness in linguistic comprehension combined with average code-related skills. A smaller number of participants fell in the bottom-left quadrant, corresponding to weaknesses in both components, but no participants fell in the top-left quadrant, corresponding to a specific weakness in code-related risks with average linguistic comprehension.

To shed further light on the sources of reading difficulties, we then cross-tabulated the prevalence of weaknesses on these two components for the subsample of 60 students who demonstrated low third grade English reading comprehension (i.e., below a standard score of 90). Among these students with poor reading comprehension, a large majority (81.7%) demonstrated weaknesses in linguistic comprehension alone. Among this subsample, very similar proportions for this profile were found for LM learners (81.7%) and native English speakers (78.9%). A notable minority of students with low third grade reading comprehension (13.3%) demonstrated weaknesses in both linguistic comprehension and code-related skills; this profile was somewhat more common among LM learners (18.2%) than among native English speakers (5.3%), although still relatively rare in both groups. In addition, only three students with low third grade reading comprehension demonstrated average levels of both linguistic comprehension and code-related skills, providing further support for the simple view of reading. Results were similar for the small number of participants with unknown LM status. Figure 4 displays results for this subsample of students with low third grade reading comprehension. As shown, the large majority of students fall in the bottom right quadrant representing linguistic comprehension weaknesses combined with average code-related skills and a small number of students fall in the bottom left quadrant representing weaknesses in both components. Only a few students fall in the top-right quadrant representing average levels on both components, and as noted above, no students fall in the top-left quadrant representing weaknesses in code-related skills alone.
The significant interaction between linguistic comprehension and code-related skills found in analyses for the first research question suggested that the combination of weaknesses in both components would be associated with more severe difficulties with reading comprehension, compared to a weakness in linguistic comprehension alone. To investigate this hypothesis further, we estimated the mean third grade reading comprehension for these two cognitive component profiles. As shown in Table 3, students who demonstrated weaknesses in both cognitive components had reading

**Table 3. Means and Standard Deviations for Grade 3 Reading Comprehension by Cognitive Component Profile, to Illustrate Severity of Reading Comprehension Difficulties Associated With Each Profile, With Associated Difference and Results of a t Test for Mean Equivalence**

<table>
<thead>
<tr>
<th></th>
<th>Low Linguistic Comprehension Only</th>
<th>Low in Both Code-Related Skills and Linguistic Comprehension</th>
<th>Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M</td>
<td>SD</td>
<td>M</td>
</tr>
<tr>
<td>Entire sample</td>
<td>85.96</td>
<td>10.10</td>
<td>80.13</td>
</tr>
<tr>
<td>Students with low reading comprehension</td>
<td>80.00</td>
<td>7.06</td>
<td>75.69</td>
</tr>
</tbody>
</table>

Note: Students were classified as low in reading comprehension if they received a standard score less than 90, that is, below the 25th percentile. Students were classified as low on a given component if their factor score for the component was less than 90, which is roughly equivalent to a standard score of 90 on national norms.

**Figure 4.** Scatterplot of linguistic comprehension factor scores by code-related skills factor scores for students scoring below the 25th percentile rank on Grade 3 reading comprehension (RC), with language minority (LM) learners represented by circles, native English speakers represented with squares, and students with unknown language group represented with triangles.

Note: N = 150. Solid black lines indicate a factor score that is approximately equivalent to a standard score of 90 or percentile rank of 25.
comprehension performance that was more severely constrained than that of students who demonstrated a weakness in linguistic comprehension alone, a result that held for both the whole sample and for the subsample of students below the cut score in reading comprehension. Although these differences did not reach statistical significance (p = .097 and p = .120, respectively), their direction and magnitudes (5.83 and 4.30 standard score points) do support the prior results in suggesting that students with weaknesses in both components have more severely impaired reading comprehension.

Discussion

The current study was designed to build on theoretical models and empirical studies that have identified independent cognitive components of reading difficulties, including the simple view of reading (Gough & Tunmer, 1986), while shedding light on components within the ecological domain as suggested by the componental model of reading (Aaron et al., 2008), among others (e.g., Berninger, Dunn, Line, & Shimada, 2004; Dudley-Marling, 2004; Snow et al., 1998). Specifically, we investigated whether the relative contributions of the cognitive components of code-related skills and linguistic comprehension to reading comprehension differed by the ecological component of home language use, that is, whether students primarily speak a minority language, Spanish, or the societal language of English at home. In addition, by investigating these questions with a sample of students from low-income backgrounds attending urban schools, we sought to produce findings that could be contrasted with those from studies conducted with middle-class students in suburban contexts to shed light on the ecological components of socioeconomic status and schooling context. The two research questions involved different analytic approaches that examined these issues in complementary ways—for the first question, we looked across the entire continuous skill distribution in the sample to investigate the relative contributions of cognitive components and their interaction to reading comprehension, and for the second question, we took a more categorical approach by exploring the relative prevalence of different unique cognitive profiles for students demonstrating difficulties with reading comprehension at the end of the primary grades.

This study yielded three major findings, each of which was confirmed across these two analytic approaches. Our first major finding is that the interaction between linguistic comprehension and code-related skills, measured in first and second grade, predicted reading comprehension in third grade, beyond their individual contributions, providing support for the simple view. The relative unique contributions of these two cognitive components in our sample suggest that linguistic comprehension explains much more of the variation in reading comprehension than code-related skills for the learners studied. At the same time, the interaction indicates that weaknesses in code-related skills, when found in combination with limited linguistic comprehension, may lead to more severe difficulties than weaknesses in linguistic comprehension alone, a hypothesis further supported by the categorical analyses. Our second major finding was that the most prevalent cognitive component profile in these schools, by far, was that of underdeveloped linguistic comprehension skills combined with adequate code-related skills. The next most common profile was a distant second and involved weaknesses in both code-related skills and linguistic comprehension, whereas no students were found in the participating schools that demonstrated the “classical dyslexic” profile of weaknesses in code-related skills combined with well-developed oral linguistic comprehension. Our third major finding was that these results—for both relative contributions across the entire skill distribution and prevalence of categorical subtypes—were strikingly similar for Spanish-speaking LM learners and native English speakers from similar socioeconomic backgrounds.

These findings have important theoretical implications for understanding the relation among ecological and cognitive components of reading difficulties. They also have practical implications for understanding heterogeneity in reading difficulties, as they are commonly found among linguistically diverse children in urban schools, as well as implications for addressing heterogeneous difficulties in more systematic ways than are typically found in schools. Below, we explore these implications for theory and practice and note remaining questions for future research.

Attending to the Ecological Domain: Socioeconomic and Schooling Contexts Might Trump Language Background

The findings from the current study converge with prior studies in supporting the importance and partial independence of both code-related skills and linguistic comprehension skills (e.g., Aaron et al., 1999; Aaron et al., 2008; Catts et al., 2003; Frith & Snowling, 1983; Gough & Tunmer, 1986). They also add to growing evidence that this general conclusion extends to Spanish-speaking LM learners (e.g., Hoover & Gough, 1990; Lesaux et al., 2010; Mancilla-Martinez et al., 2009). It is more interesting, however, that our findings diverge from those of prior studies conducted in suburban contexts in the relative prevalence of cognitive component profiles found. Prior research has placed estimates of the prevalence of “hyperlexic” or “specific comprehension deficits” (i.e., well-developed decoding combined with underdeveloped linguistic comprehension) in primary-grade readers in the range of 15% of poor readers (Catts et al., 2003) or 10% of all students (e.g., Yuill & Oakhill, 1991). By contrast, we found that students with
this profile made up more than 80% of participating students with low reading comprehension and more than 60% of all children in the participating classrooms. Our results are somewhat more consistent with those of Aaron and colleagues (1999), who found that 5 of the 16 poor readers served by Title I programs had weaknesses in comprehension (listening or reading) despite adequate decoding. Although Aaron et al. did not speculate why this might be the case, we hypothesize that this large difference in the prevalence of this profile in our sample, compared with others, highlights the role of components in the ecological domain in reading difficulties.

When we considered the potential ecological components that could explain this divergence, we originally suspected that home language background would explain the relatively high prevalence of the “specific comprehension deficit” profile. Indeed, a growing body of research suggests that this profile may be common among LM learners (for a review, see Lesaux, 2006), particularly Spanish-speaking LM learners from low-income backgrounds in the primary grades (e.g., Manis et al., 2004) as well as later grades (e.g., Lesaux et al., 2010; Lesaux & Kieffer, 2010; Proctor et al., 2005). Consistent with these findings, we found that within the entire sample, LM learners were somewhat more likely to demonstrate this profile than their classmates (70% of LM learners vs. 50% of native English speakers in the participating classrooms), a result further supported by the negative association between LM status and linguistic comprehension in the SEM models shown in Figures 1 and 2.

However, among those students demonstrating low reading comprehension in third grade, this profile of specific weaknesses in linguistic comprehension was, in fact, equally common among native English speakers and their LM counterparts (79% vs. 81%). This result suggests that this cognitive skill profile may be far more common among particular populations of struggling monolingual readers than one would expect from prior studies (e.g., Catts et al., 2003; Stothard, 1994; Yuill & Oakhill, 1991). It further suggests that language background, in and of itself, may not go very far in explaining the high prevalence of this profile among LM learners previously found. In contrast to studies that have compared LM learners’ performance to national norms for monolinguals, we compared native English speakers and LM learners who were sampled from the same schools and were closely matched to the LM learners in their family income levels. Our findings suggest that the effects of these commonalities in ecological contexts among students may trump the language background differences between them.

The hypothesis that socioeconomic contexts, both at home and at school, may predict the prevalence of subtypes of reading difficulties better than does language background is supported by research that has documented the relation between socioeconomic status and experiences that promote language development in native English speakers (e.g., Hart & Risley, 1995; Storch & Whitehurst, 2002; Zill et al., 1995). It is also consistent with evidence from analyses of nationally representative data sets that achievement differences between LM learners and native English speakers become much smaller once child- and school-level socioeconomic status are taken into account (e.g., Kieffer, 2008, 2010; Reardon & Galindo, 2009). As Snow et al. (1998) and many others (e.g., Shonkoff & Phillips, 2000; Sirin, 2005; White, 1982) have suggested, poverty is a risk factor for reading difficulties that operates not only at the individual or family levels, but also at the school and community levels. Although there is good evidence to suggest that poverty puts children at risk for difficulties in learning to read words and many efforts are aimed at preventing such difficulties, our findings suggest that this notion should extend to include the linguistic comprehension necessary for successful reading comprehension in third grade and beyond.

In addition to commonalities in socioeconomic status, the similarities among LM learners and native English speakers may also reflect the ecological influence of shared educational experiences. Both the high prevalence of specific weaknesses in linguistic comprehension and the absence of specific weaknesses in code-related skills in both groups may very well be the result of the instructional environments in the participating schools. Although we did not collect observational data in the participating schools, the approach of their adopted reading programs would suggest a strong emphasis on code-related skills and general reading comprehension strategies and a relatively weak emphasis on oral language, consistent with national trends documented by observational research (e.g., Gamse, Bloom, Kemple, & Jacob, 2008). Such an emphasis would be consistent with our findings that none of the children in the participating schools demonstrated weaknesses in code-related skills alone, as well as our finding of many poor readers with underdeveloped linguistic comprehension.

Our findings also suggest the possibility that theoretical models that highlight differences between LM learners and native English speakers may be obscuring the heterogeneity in cognitive, psychological, and ecological components within each language group. By featuring language background as a component within the ecological domain that is unique from cognitive components, the componential model of reading leads to the hypothesis that LM learner status would predict reading comprehension, after accounting for cognitive skills. In our SEM analyses, we did not find that to be the case. Without controls, LM learner status had a negative correlation with third grade reading comprehension, but after controlling for the contributions of code-related and linguistic comprehension, LM learner status did not explain additional variation in reading comprehension (as shown in Figure 2). Similarly, our categorical analyses
indicated that the reading difficulties of every LM learners studied could be explained by weaknesses in linguistic comprehension and/or code-related skills, that is, we did not find a single LM learner who demonstrated low reading comprehension combined with sufficient levels of these two cognitive component skills. We thus have little evidence to support the notion that language background explains differences in reading comprehension, beyond its associations with linguistic comprehension and code-related skills. Although we hesitate to place too much weight on this null result, given that it could be the result of limited statistical power, it nonetheless raises the possibility that language background may be more of a predictor of cognitive—and perhaps psychological and other ecological—components of reading than an independent component itself.

Implications for Practice

Several implications related to preventing reading difficulties emerged from the current study. First, our results suggest that many, even a majority of, reading difficulties in urban schools with high concentrations of poverty reflect weaknesses primarily with linguistic comprehension as opposed to code-related skills. This contrasts with the current instructional emphases in many urban elementary schools. Observational research on primary-grade reading instruction in Title I schools suggests that instructional time is more often dominated by instruction in phonics and generalized reading comprehension strategies than instruction in vocabulary or oral language (e.g., Gamse et al., 2008). Moreover, recent efforts to improve early reading instruction, such as Reading First and related efforts, have succeeded in increasing the amount of instructional time devoted to code-related skills but have not increased the time spent on teaching oral vocabulary (Gamse et al., 2008), despite the inclusion of vocabulary as one of the “Big Five” reading skills highlighted by the National Reading Panel (NICHD, 2000). The current study supports the recommendation that general education—or Tier 1 instruction—in urban, high-minority settings should also include targeted instruction on oral language and vocabulary. This appears to be the case for both LM learners and their native English-speaking peers.

The current results also have implications for early identification and progress monitoring. Specifically, our results indicate that in addition to code-related skills, screening and progress monitoring instruments must also tap oral language and linguistic comprehension; otherwise, a large number of students will not be appropriately identified as requiring supplemental—or Tier 2—intervention. In this study, the majority of third graders with reading comprehension difficulties presented with linguistic comprehension difficulties in first or second grade, suggesting that linguistic comprehension difficulties can be detected as early as first grade. Given that linguistic comprehension appears to represent a major source of reading difficulties in children in urban contexts (e.g., Aaron et al., 1999; Lesaux & Kieffer, 2010), it is especially important that we regularly monitor children’s linguistic comprehension throughout elementary school. Future research is needed both to develop reliable and efficient screening and progress monitoring measures of linguistic comprehension as well as to determine whether such measures are equally effective for LM learners and native English speakers.

Finally, the current results raise issues in the larger context of learning disabilities research and practice regarding what is meant by struggling readers—either LM learners or native English speakers. That a majority of struggling readers in urban, high-minority settings might not present with the classic “dyslexia” profile suggests that future LD research should focus on understanding how to accommodate linguistic comprehension difficulties within the conceptualization of learning disabilities—reading disabilities in particular. At issue is the extent to which the struggling readers in the current and similar studies represent students with unexpected underachievement and the extent to which special education is responsible for addressing the needs of a large majority of struggling readers in primary school classrooms. Future research is needed to clarify how to operationalize unexpected underachievement in these contexts (e.g., Fletcher, Denton, & Francis, 2005) as well as offer insight into how to supplement general reading instruction with the language-rich experiences that children in urban contexts require to become proficient readers.

Limitations and Future Research

The current study has a few limitations that raise questions for future research. First and foremost, it is possible that the divergence between our findings and prior studies concerning the unique contribution of code-related skills may be the result of the specific measures used. Specifically, Hoover and Gough (1990), in finding a unique contribution of decoding to reading comprehension in bilingual children, used a nonword reading task to measure phonological decoding skills. By contrast, we used a latent variable composite of phonological awareness and letter-word identification, which may have led to an underestimation of the effects of code-related skills. Readers may have been able to perform relatively well in reading real words by relying in part on visual cues without developing adequate phonological decoding skills, an inefficient strategy that would be unlikely to promote later reading comprehension (Ehri, 2005). Future studies should include both real word and nonword decoding tasks to investigate their relative contributions to reading comprehension for readers from linguistically diverse backgrounds attending urban schools.

Second, we were not able to assess the Spanish-speaking LM learners in their first language because of practical constraints and the other aims in the larger
research project. Given evidence for cross-linguistic relations, particularly in the domain of phonological awareness (for a review, see Genesee, Geva, Dressler, & Kamil, 2006), it is possible that understanding students’ levels of code-related skills and linguistic comprehension in Spanish would have added to our understanding of their development and difficulties in English reading comprehension. Third, although we suspect that shared educational experiences that were common to both the LM learners and native English speakers explain their similarities in cognitive component skill profiles to some extent, this remains a hypothesis rather than a conclusion. Future research should include observational data on early reading instruction, preferably across a wide number of classrooms and schools, to investigate whether ecological differences in classroom instruction are associated with differences in the prevalence of certain profiles. Fourth, it is worth noting that the moderate sample size yielded relatively limited statistical power to detect small effects (see Note 5), so future research with larger samples is necessary to confirm the null results found.

Conclusion

Findings from this study highlight the importance of considering the ecological context in which students from linguistically diverse backgrounds learn to read with comprehension. Although the ecological component of language background was found to be associated with weaknesses in linguistic comprehension in English and consequently elevated risk for difficulties with reading comprehension, findings suggest that the effects of language background may be less important than the ecological effects of socioeconomic status and schooling context. The high prevalence of weaknesses in linguistic comprehension found among both Spanish-speaking LM learners and native English speakers in first and second grade highlights the need for improvements in the quantity and quality of classwide oral language instruction as well as the importance of early identification and intervention in these skills.

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Notes

1. Although perhaps less theoretically elegant, this latter formulation is more likely to fit behavioral data for psychometric reasons. The \( R = D \times C \) formulation relies on the idea that when \( D \) and \( C \) each equal 0, then \( R \) will equal 0. However, cognitive assessments rarely, if ever, have a true zero; that is, a score of zero on a cognitive assessment virtually never represents an absence of skill, so the additive terms are necessary to scale the interaction appropriately.

2. Four students in the participating classrooms were language minority learners but spoke languages other than Spanish at home. They were excluded from the analyses.

3. One limitation of this reading classification is that it is based on a single measure of reading comprehension and is thus more susceptible to measurement error than classifications based on multiple measures (e.g., Compton, Fuchs, Fuchs, Ellemann, & Gilbert, 2008; Francis et al., 2005).

4. It is worth noting that if three waves of data on each of these observed indicators had been available, a latent growth model that captured variation in students’ rate of growth as well as levels would have offered some advantages over this model. However, because of practical constraints and the range of other measures used in the overall research project (i.e., measures of mathematical development), we were unable to collect data on each of these indicators in third grade but hope to do so in future research.

5. It is worth noting that the current sample size is somewhat smaller than suggested by some “rules of thumb” for minimum sample sizes in SEM. However, as demonstrated by the reviews of research in quantitative methods conducted by MacCallum, Widaman, Zhang, and Hong (1999) and by Velicer and Fava (1998), such simple rules of thumb are invalid because they do not account for the fact that adequate sample size will always depend on the characteristics of the variables and the study design. A moderate sample size does not, necessarily, lead to less trustworthy findings when path analysis is used, as opposed to any other statistical technique. Nonetheless, as with results from ordinary least squares regression, null results from path analyses using relatively smaller samples should be interpreted with more caution than null results from analyses with larger samples.

References


Savage, R. (2006). Reading comprehension is not always the product of nonsense word decoding and linguistic comprehension: Evidence from teenagers who are extremely poor readers. Scientific Studies of Reading, 10, 143–164.


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