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Article *in* Scientific Studies of Reading · October 2008

DOI: 10.1080/10888430802378526

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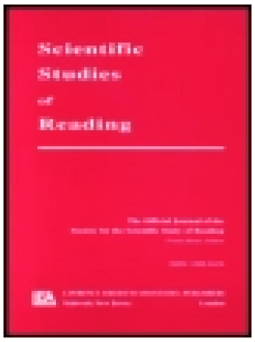

Scientific Studies of Reading

ISSN: 1088-8438 (Print) 1532-799X (Online) Journal homepage: http://www.tandfonline.com/loi/hssr20

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SCIENTIFIC STUDIES OF READING, *12*(4), 351–371

ISSN: 1088-8438 print / 1532-799X online
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This study investigated the associations of oral language and reading skills with a sample of 282 Spanish-speaking English language learners across 3 years of elementary school. In the 3rd grade, the English and Spanish decoding measures formed two distinct but highly related factors, and the English and Spanish oral language measures formed two factors that showed a small positive correlation between them. The decoding and oral language factors were used to predict the sample's English and Spanish reading comprehension in the 6th grade. The decoding and oral language factors were both significant predictors of reading comprehension in both languages. The within-language effects were larger than the cross-language effects and the cross-language effects were not significant after accounting for the within-language effects.

The number of English language learners (ELLs) in the United States is clearly increasing, and the majority of ELLs are Latino children who speak Spanish as their first language (Fox, Connolly, & Snyder, 2005; U.S. Department of Education, 2003). Studies indicate that Spanish-speaking ELLs struggle to master oral language and reading comprehension in English in the United States (Miller et al., 2006; Proctor, August, Carlo, & Snow, 2006; Thomas & Collier, 1997). It is important to obtain a clearer picture of the factors that contribute to the development of reading skills in this population. Our goal in this study was to investigate within- and cross-language relations between word decoding, oral language skill, and reading comprehension in Grades 3 to 6 in a sample of Spanish-speaking ELLs.

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A crucial point about ELLs is that they are bilingual and biliterate to varying degrees. Whether children participate in transitional bilingual programs (as was the case for our sample), two-way Spanish-English immersion, or English immersion, a key issue is how well skills in their first language (L1) transfer to their second language (L2). Cross-linguistic transfer is thought to occur whenever there is a moderate to strong correlation between abilities in L1 and abilities in L2 (Bialystok & Hakuta, 1994; Cummins, 1979; Durgunoğlu, 2002). Consistent cross-linguistic correlations have been reported for bilingual children in the domains of phonological awareness (Cisero & Royer, 1995; Comeau, Cormier, Grandmaison, & Lacroix, 1999; Durgunoğlu, Nagy, & Hancin-Bhatt, 1993; Lindsey, Manis, & Bailey, 2003; Manis, Lindsey, & Bailey, 2004; Verhoeven, 1994) and word identification and decoding (August, Calderon, & Carlo, 2001; Da Fontoura & Siegel, 1995; Geva, Wade-Woolley, & Shany, 1997; Lambert & Tucker, 1972; Lindsey et al., 2003; Manis et al., 2004).

Although phonological awareness and word identification are critical to reading development, models of reading comprehension (e.g., the simple view of reading; Gough & Tunmer, 1986) emphasize the increasing contribution made by oral language in later elementary school years (Hoover & Gough, 1990; Perfetti, 1985). Durgunoğlu (2002) and Bialystok and Hakuta (1994) argued that competence in the L1 may transfer to L2, based on metalinguistic concepts that are shared between the two languages, cognate words and specific comprehension strategies. A few studies have examined cross-linguistic correlations for higher level oral language and reading comprehension skills. However, not all of these studies have controlled for levels of word reading and phonological decoding skill. For instance, Miller et al. (2006) analyzed several aspects of children's narrative production in English and Spanish, but did not account for word reading skills. In Miller et al.'s study, English measures of narrative production accounted for substantial variance in English reading comprehension, controlling for grade level, and identical Spanish measures accounted for 2% of additional variance. Proctor et al. (2006) found that Spanish vocabulary accounted for 1% of the variance in English reading comprehension for their fourth-grade sample of Spanish-speaking ELLs when levels of English decoding, vocabulary, and listening comprehension were taken into account. In addition, a small amount of additional variance was explained by the interaction between English decoding fluency and Spanish vocabulary (i.e., more skilled decoders benefited from higher vocabulary scores, but less skilled decoders did not). This finding is a cross-linguistic extension of the assertion from the simple view of reading that the interaction between decoding and oral language will aid in the prediction of reading comprehension (Hoover & Gough, 1990). It is possible that L1 oral language skills become more important for English reading comprehension as children attain higher levels of decoding fluency, but this finding requires replication in a longitudinal design.

In contrast to Miller et al.'s (2006) and Proctor et al.'s (2006) findings, evidence that oral language skills in English and Spanish may be largely independent was reported by Cobo-Lewis, Eilers, Pearson, and Umbel (2002). They factor analyzed parallel sets of tasks in Spanish and English in a large cross-sectional sample of second and fifth graders, controlling for socioeconomic status, language exposure in the home, and instructional program. They found a language-general factor that accounted for the majority of the variance and had relatively equal loadings of English and Spanish reading, spelling, and writing tasks. The English and Spanish oral language tasks loaded on their own language-specific factors. Cobo-Lewis et al. proposed that reading and writing skills are highly related for English and Spanish but oral language skills are not. It is possible that certain aspects of oral language, such as metalinguistic and cognate awareness, show stronger cross-linguistic correlations than other aspects of oral language (Ordóñez, Carlo, Snow, & McLaughlin, 2002). Additional research is needed to clarify the relationships between oral language skills and reading comprehension in bilinguals.

A problem for most prior research on cross-linguistic transfer is that the data are cross-sectional. August et al. (2001) noted that a strict definition of transfer would require that adequate literacy in L1 be achieved, that the research design be longitudinal, and that the analyses control for the initial level of L2 ability. Manis et al. (2004) carried out such a study in grades K–2 with 251 children who began the study with very low levels of English oral language skill and who participated in a transitional bilingual program. By second grade, the children scored, on average, at the 48th percentile in Spanish reading comprehension and at the 46th percentile in English reading comprehension, so the transitional bilingual program appeared to have been moderately successful. Measures in Spanish of basic literacy skills in kindergarten accounted for about 20% of the variance in second-grade English reading comprehension. When first-grade basic literacy measures in English were added to the regression equation, the predictors accounted for 58% of the variance, but only English variables were significant. Commonality analyses revealed that English basic literacy accounted for 31% unique variance, Spanish basic literacy 2% unique variance, and the common variance between Spanish and English predictors was 25%. Manis et al. proposed that the sizeable common variance could be thought of as cross-linguistic variance but that growth in English literacy was partially independent of Spanish language competence and contributed more strongly to later reading comprehension. An obvious limitation of the study is that reading comprehension may be largely based on decoding skills in second grade. A stronger contribution of oral language skills to reading comprehension might be expected in later grades (Hoover & Gough, 1990; Perfetti, 1985) resulting in two potential outcomes. One possibility is that L1 oral language skills have a "sleeper effect" (i.e., they manifest themselves in later grades). Alternatively, the oral language skills that contribute most strongly to reading comprehension in later grades may be language specific in nature.

To shed further light on the importance of within- and cross-linguistic factors in the development of reading comprehension in ELLs, we analyzed data for a longitudinal sample of ELLs in Grades 3 to 6. The study was a continuation of the longitudinal research by Lindsey et al. (2003) and Manis et al. (2004). Based on prior conceptual analyses and empirical studies of reading comprehension (e.g., Hoover & Gough, 1990; Proctor et al., 2006), we grouped our measures into three broad categories; word-level decoding skills (i.e., word identification and speeded word reading), oral language skills (i.e., expressive vocabulary and listening comprehension), and reading comprehension (two measures). Our primary goal was to ascertain the most parsimonious latent variable model relating third-grade decoding and oral language skills to sixth-grade reading comprehension.

It was unclear from prior research (e.g., Cobo-Lewis et al., 2002; Manis et al., 2004; Proctor et al., 2006) whether word-level decoding skills would form a single cross-language factor or two within-language factors. It was anticipated that oral language would form distinct factors in each language. Accordingly, as a first step, we conducted a confirmatory factor analysis (CFA) of the tasks in third grade.

A second step was to fit structural equation models (SEMs) with the third-grade predictors (i.e., decoding and oral language) in English and Spanish predicting reading comprehension in sixth grade in both languages. This allowed us to address the issue of whether oral language skills became more important in the prediction of reading comprehension in the sixth grade than had been reported in grades K–2 (Manis et al., 2004). The SEM analyses also enabled us to test whether cross-language predictions would account for unique variance when within-language variables were controlled. We could determine this for both English and Spanish reading comprehension over a 3-year prediction interval, which to our knowledge makes this study unique. We would expect that the cross-language associations would be small and possibly nonsignificant after accounting for the within-language factors based on the earlier results with this sample (Manis et al., 2004). Similarly, the results of Proctor et al. (2006) and Miller et al. (2006) suggest that only a small amount of residual variance in L2 reading comprehension may be predicted by L1 oral language. Our study extended prior work by looking at these predictions longitudinally, extending them to later grades, and looking at the prediction of reading comprehension in both languages.

Finally, we conducted hierarchical regression analyses with the decoding and oral language measures to find out how much variance of English and Spanish reading comprehension was shared in common, and how much was unique. The amount of common variance we find would have implications for theoretical models of cross-linguistic transfer. Consistent with past research (e.g., Hoover & Gough, 1990; Proctor et al., 2006), we also tested whether the within- and cross-language decoding and oral language interaction terms accounted for significant unique variance. These interaction terms allowed us to determine whether having more advanced decoding skills allowed one to benefit more from stronger oral language abilities.

METHOD

Participants

The current research is part of a larger 7-year longitudinal investigation. The initial sample from the larger investigation comprised 303 Latino kindergarten children who participated in an early transition bilingual curriculum called Esperanza (Hagan, 1997). The sample resided in a Texas town bordering on Mexico. One of the school district's requirements was that all of the children in the program had very limited knowledge of English at the beginning of kindergarten, as determined by their language assessment tests. The language assessment data were not accessible to the research project. However, the measures given by the research team in the fall of first grade (the first point at which English language measures were given) show that the sample was well below average in English oral language skill. The mean national U.S. percentile scores were 3.57 ($SD = 7.63$) for Picture Vocabulary and 12.27 ($SD = 19.19$) for Memory for Sentences in the first grade. The children ranged in age from 8.2 to 9.8 years ($M = 9.2$ years) when tested at the end of third grade. Age significantly correlated with only 1 of the 12 variables used in the study (i.e., with the Spanish translation of the Gray Silent Reading Test in sixth grade; $r = .16$, $p < .05$) and the correlation was small. Hence, age was not used as a covariate. Boys comprised 47.5% ($n = 144$) of the original sample and girls comprised 52.5% ($n = 159$). The socioeconomic status based on family income was very low, as indicated by the fact that more than 90.0% of the children in the school district qualified for the free lunch program.

The Esperanza program was a Spanish language reading and language arts program based on the English literacy program Language Enrichment One (Neuhaus Education Center, 1997). The teachers emphasized phonological awareness activities, multisensory introduction of new letters, and oral language training in Spanish and English in kindergarten. Although the Language Enrichment One program was introduced during first grade, many children continued reading instruction in Spanish and were transitioned gradually to all English instruction at varying times during elementary school. We did not assess the amount of English used in classrooms, but our informal observations indicated that it varied. The majority of the children continued to use a combination of Spanish and English to communicate with their fellow students and teachers throughout elementary school. The teachers and teachers' aides were all native Spanish speakers. In the later grades of elementary school, the children were given a typical curriculum that included English instruction in language arts, reading, math, social studies and science. However, according to district personnel, parallel versions of all main textual materials were provided in Spanish and used as individually needed.

Two schools were randomly chosen from each of the five subdistricts in the town, which resulted in a total of 10 schools. Entire classrooms were picked at random from these 10 schools. The second author individually trained 15 bilingual language assessment testers employed by the school district to administer the assessment batteries in grades K–3 and paraprofessional testers trained and employed by the research project administered the tests in the fifth and sixth grades. The testers at all grade levels were retrained before each ensuing testing period, and we monitored the quality of their work. The research team and school district made every effort to follow the children who moved within the school district throughout the duration of the study.

Analyses for our study are based on data collected during a 4-week period in May 2002 (third grade) and within a 4-week period in January 2005 (sixth grade). The children attended elementary school through the sixth grade. They were individually tested in a quiet room during regular school hours. The tasks analyzed in this project were part of a larger test battery. These test batteries took approximately 50 to 90 min to administer.

The attrition rate (based on the 303 participants recruited at the beginning of the full longitudinal study) varied from grade to grade and was modest. Although some children missed certain data collections, many of them later came back into the study. There were 250 participants in the third grade and 245 participants in the sixth grade. The CFA presented in the results is based on the 250 participants (115 boys, 135 girls) in the third grade. The SEM analyses incorporated all 282 participants (130 boys, 152 girls) that we had data for at one of the two grades. The regression analyses presented in the results are based on the 211 participants (105 boys, 106 girls) who had complete data in both third and sixth grade. The attrition rate was 17.5% for the CFA, 6.9% for the SEM analyses, and 30.4% for regression analyses. The retained children and those that dropped out of the study did not differ significantly on any of the measures given in kindergarten at the start of the study.

Measures

Letter-Word Identification (Woodcock & Johnson, 1989; Woodcock & Muñoz-Sandoval, 1995). In these tasks, the children were shown letters and then words of increasing difficulty.

Speeded word reading. The children were instructed to read 50 high-frequency words (e.g., English: *hat, jump*; Spanish: *casa, pueblo*) aloud as fast as they could without making mistakes. The time in seconds and the number of errors were recorded and were log transformed to reduce the positive skewness that was apparent for both versions. The time in seconds correlated with the number of errors for the English ($r = .78, p < .001$) and Spanish ($r = .75, p < .001$) versions. The two indicators in both languages were transformed to z scores and then averaged to form a composite variable assessing speed and accuracy. Finally, we reverse coded the composite variables so that higher scores indicated better performance.

Picture Vocabulary (Woodcock & Johnson, 1989; Woodcock & Muñoz-Sandoval, 1995). These tasks measure the ability to produce the names of pictured objects.

Listening Comprehension (Woodcock & Johnson, 1989; Woodcock & Muñoz-Sandoval, 1995). These tasks require children to supply the missing word in a short recorded passage.

Memory for Sentences (Woodcock & Johnson, 1989). Children listened to and repeated phrases and sentences increasing in length and grammatical complexity.

Passage Comprehension (Woodcock, McGrew, & Mather, 2001; Woodcock & Muñoz-Sandoval, 1995). The initial items in these tasks involved symbolic learning, or the ability to match a rebus (i.e., a pictographic representation of a word) with an actual picture of the object. The remaining items were presented in a cloze format and required the children to read a short passage and identify a missing key word that is appropriate for the context of the passage.

Gray Silent Reading Test (Wiederholt & Blalock, 2000). This task, which is published only in English, requires the children to read short stories and answer five multiple-choice questions about the stories. The stories progress in difficulty and testing is stopped once children miss three of the five questions for a given story. Form B of the test was given, and it had 13 stories and 65 items. In addition, two professional translators (one of which is the second author) collaborated on a translation of Form A into Spanish for meaning, content, and register. The translated version had 13 stories and 65 items. Inspection of the comprehension questions for both English and Spanish forms suggested that there were fewer questions that could be answered without reading the passage than is the case for the Gray Oral Reading Test (see Keenan & Betjemann, 2006).

RESULTS

Overview

We specified latent variable models in Amos 6.0 (Arbuckle, 2005) to investigate the associations of Grade 3 decoding and oral language skills to Grade 6 reading comprehension. With the exception of the English and Spanish speeded word reading measures, the models used data files based on the untransformed number of items correctly completed for each task. We implemented maximum likelihood estimation that allowed us to analyze all 282 participants that we had scores for at one of the two waves of data for the longitudinal analyses (McArdle, 1994). We used the chi-square statistic, the χ^2/df, the root mean square error of approximation (RMSEA), and the comparative fit index (CFI) to evaluate the models.

Descriptive Statistics

The means for the percentile scores and the means, standard deviations, and ranges for the raw scores for the observed variables collected in third grade and sixth grade used in the CFA models and the SEM analyses are shown in Table 1. With the exception of the speeded word reading measures that were log transformed, none of the variables showed marked departures from normality. In the third grade, the sample as a whole performed in the average range on the English version of Letter-Word Identification and above average on the Spanish version of Letter-Word Identification. On the other hand, the sample as a whole performed substantially below average on the English oral language measures and performed slightly below average on the Spanish oral language measures. In the sixth grade, the sample's reading comprehension scores were below average in English and Spanish. The scores indicate that this sample is struggling to master English oral language and reading comprehension skills, and they have not attained an average level of skill in Spanish either.

The implied bivariate correlations among these variables that resulted from the maximum likelihood estimation method are provided in Table 2. The results reveal strong within-language correlations and several cross-language correlations. The cross-language correlations appeared to be larger for the decoding measures than for the oral language measures.

CFA With Third-Grade English and Spanish Decoding and Oral Language Measures

As a first step in exploring cross-language transfer, we specified a three-factor CFA with the third-grade predictor variables. Based on the results of Cobo-Lewis et al. (2002), the four indicators for decoding (i.e., English and Spanish Letter-Word Identification and speeded word reading) were hypothesized to load on one factor and the oral language measures (i.e., Picture Vocabulary and Listening Comprehension) were hypothesized to load on their own language specific factors. The model initially resulted in a covariance matrix that was not positive definite (Wothke, 1993), which suggests that we specified an incorrect model for the data. We determined that the error terms for the Listening Comprehension tasks needed

TABLE 1
Means for the Percentile Scores and Means, Standard Deviations, and Ranges for the Raw Scores and Reliabilities for all of the Variables Used in the Longitudinal Model

	National Percentile[a] (*M*)	Raw Scores *M*	*SD*	*Range*	*Reliability*
Grade 3					
English Letter-Word Identification	50.30	36.31	7.51	0–57	.94
Spanish Letter-Word Identification	68.27	42.32	12.86	0–58	.93
English speeded word reading[b]	—	0.00	0.95	–3.00–1.44	—
Time in seconds	—	53.69	47.08	15–375	—
Number of errors	—	4.38	8.20	0–50	—
Spanish speeded word reading[b]	—	0.00	0.94	–2.37–1.48	—
Time in seconds	—	88.80	69.84	22–438	—
Number of errors	—	7.90	12.06	0–50	—
English Picture Vocabulary	8.30	23.45	4.90	0–41	.85
Spanish Picture Vocabulary	38.62	23.81	5.44	0–40	.75
English Listening Comprehension	13.66	16.21	5.89	0–30	.81
Spanish Listening Comprehension	36.92	19.44	5.74	0–35	.85
Grade 6					
English Passage Comprehension	20.84	26.06	5.27	7–42	.80
Spanish Passage Comprehension	17.83	20.69	6.67	0–35	.84
English Gray Silent Reading Test	15.84	18.75	10.84	0–57	.93
Spanish Gray Silent Reading Test	—	15.65	10.96	0–57	—

[a]National Percentile = English scores are U.S. national percentile scores and Spanish scores are based on norms from predominately monolingual Spanish-speaking children in Spain, Latin America, and the United States. [b]English and Spanish speeded word reading composites are the mean of the *z* scores for time in seconds and number of errors.

to be allowed to correlate. This correlation implies that there was significant task specific variance for these two measures that the covariance between the factors did not account for. All of the standardized factor loadings in the three-factor model were between .67 and .94. However, the model did not provide an acceptable fit to the data, $\chi^2(16, N = 250) = 323.17$, $p < .001$ ($\chi^2/df = 20.20$, RMSEA = .29, CFI = .78). The leading theoretical alternative to Cobo-Lewis et al.'s (2002) findings is a four-factor model, with independent but correlated decoding and oral language factors for each language.

We specified a four-factor CFA to better explain the associations among the third-grade measures. The two indicators for decoding and oral language were hypothesized to load on their own language specific factors (see the left side of Figure 1). All possible covariances were estimated among the four latent factors. We de-

TABLE 2
Implied Correlations Among the Variables in the Longitudinal Model Based on Maximum Likelihood Estimation

	1	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*	*11*	*12*
1. Eng. Letter-Word ID	—											
2. Eng. Speed. Word Reading[a]	.80***	—										
3. Span. Letter-Word ID	.68***	.63***	—									
4. Span. Speed. Word Reading[a]	.65***	.66***	.83***	—								
5. Eng. Picture Vocabulary	.53***	.49***	.21***	.20***	—							
6. Eng. Listening Comp	.55***	.51***	.21***	.20***	.64***	—						
7. Span. Picture Vocabulary	.28***	.26***	.54***	.52***	.19**	.19**	—					
8. Span. Listening Comp	.27***	.25***	.53***	.51***	.18**	.31***	.72***	—				
9. Eng. Passage Comp	.70***	.65***	.45***	.43***	.56***	.58***	.23***	.23***	—			
10. Eng. Gray Silent Reading	.56***	.52***	.36***	.34***	.45***	.47***	.19**	.18**	.71***	—		
11. Span. Passage Comp	.55***	.51***	.73***	.70***	.18**	.19**	.51***	.50***	.57***	.45***	—	
12. Span. Gray Silent Reading	.45***	.41***	.60***	.57***	.15*	.15*	.42***	.41***	.46***	.51***	.68***	—

Note. Eng. = English; Span. = Spanish; Comp = Comprehension.
[a]English and Spanish speeded word reading composites are the mean of the z scores for time in seconds and number of errors.
$^{*}p < .05$. $^{**}p < .01$. $^{***}p < .001$.

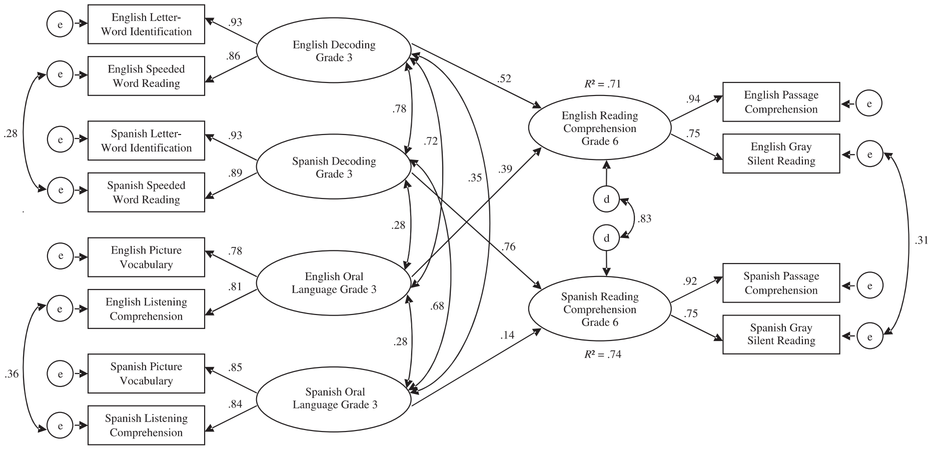

FIGURE 1 Structural equation model with the third-grade English and Spanish decoding and oral language factors predicting the sixth-grade English and Spanish reading comprehension factors. The standardized parameter estimates are shown.

termined that the error terms for the two speeded word reading tasks and the Listening Comprehension tasks needed to be allowed to correlate in the four-factor model. The four-factor model provided a reasonable fit to the data, $\chi^2(12, N = 250) = 37.88$, $p < .001$ ($\chi^2/df = 3.16$, RMSEA = .09, CFI = .98). Although not an excellent fit to the data, the four-factor model was a vast improvement over a three-factor model with the English and Spanish decoding measures loading on a single factor. There was a strong association between the English and Spanish decoding factors ($r = .78$, $p < .001$), indicating that English and Spanish decoding are a distinct but highly related pair of skills. In addition, there were moderate to strong associations between the decoding and oral language factors within-language (English: $r = .72$, $p < .001$; Spanish: $r = .68$, $p < .001$). There was a weak positive association between the English and Spanish oral language factors ($r = .28$, $p < .01$). The factor loadings and covariances among the factors were nearly identical to the ones shown in the longitudinal model in Figure 1.

Longitudinal Model Predicting English and Spanish Reading Comprehension

The second step in our analyses was to determine the most parsimonious latent variable model with the English and Spanish decoding and oral language factors in the third grade predicting English and Spanish reading comprehension in the sixth grade. We tested a longitudinal model with the four factors from the CFA from the third grade predicting latent factors representing English and Spanish reading comprehension comprised of Passage Comprehension and the Gray Silent Reading Test collected in the sixth grade (see Figure 1). We allowed the error terms for the Gray Silent Reading Tests in English and Spanish to correlate.

Manis et al.'s (2004) findings suggested that the cross-language associations would be small and potentially nonsignificant after controlling for the within-language factors. Accordingly, our initial model specified paths from the two English factors to English reading comprehension and from the two Spanish factors to Spanish reading comprehension. The model provided an excellent fit to the data, $\chi^2(40, N = 282) = 69.66, p < .01$ ($\chi^2/df = 1.74$, RMSEA = .05, CFI = .99). The predictors accounted for 71% of the variance of the English reading comprehension factor and 74% of the variance of the Spanish reading comprehension factor.

In the longitudinal model, the paths from the English ($\beta = .52$), $\Delta\chi^2(1) = 36.34$, $p < .001$, and Spanish ($\beta = .76$), $\Delta\chi^2(1) = 91.03$, $p < .001$, decoding factors were larger in magnitude than the paths from the English ($\beta = .39$), $\Delta\chi^2(1) = 27.28$, $p < .001$, and Spanish ($\beta = .14$), $\Delta\chi^2(1) = 4.19$, $p < .05$, oral language factors. Also, as shown in Figure 1, the disturbance terms positively correlated, $\Delta\chi^2(1) = 61.67$, $p < .001$, indicating a strong association between the English and Spanish reading comprehension factors in the sixth grade after accounting for the effects of the predictors. The addition of each of the four cross-language paths (e.g., Spanish decoding to English reading comprehension) did not significantly improve model fit ($\Delta\chi^2$ ranged from 0.22 to 0.45 on 1 *df*). This indicates that none of the third-grade factors had a significant direct relationship with reading comprehension in the opposing language after accounting for the within-language factors.

In the model shown in Figure 1, the path coefficients from the English predictors to English reading comprehension were both moderate in size. Although both path coefficients predicting Spanish reading comprehension were significant, the path from Spanish decoding was substantially larger than the path from Spanish oral language. As predicted, the cross-language associations were nonsignificant after accounting for the effects of the within-language factors. The results indicate that most of the variability in sixth-grade reading comprehension can be subsumed under decoding and oral language skills in the same language. To determine what proportion of this variance might be attributed to cross-linguistic variance, we conducted commonality analyses using a series of hierarchical regression models.

Commonality Analyses

We transformed the raw scores on all of the tasks to *z* scores and averaged each pair of tasks comprising the English and Spanish decoding, oral language, and reading comprehension factors. We used the four composite variables representing English and Spanish decoding and oral language to predict the composite variables representing English and Spanish reading comprehension.

Table 3 summarizes the results of sets of hierarchical regression analyses predicting English reading comprehension. The proportion of variance in English

TABLE 3
Proportions of Variance of English 6th Grade Reading Comprehension Accounted for by the Third-Grade Decoding and Oral Language Measures

	Zero-Order R^2[a]	*Unique R^2 Within Skill*[b]	*Unique R^2*[c]
English decoding[d]	.47***	.30***	.05***
Spanish decoding[e]	.19***	.01*	.00
English oral language[f]	.41***	.36***	.06***
Spanish oral language[g]	.06**	.00	.00
Decoding measures	.48***	—	.14***
Oral language measures	.42***	—	.07***
English measures	.56***	—	.37***
Spanish measures	.19***	—	.00

Note. R^2 = .56 with the four composite variables entered simultaneously.
[a]Zero-order R^2 = the proportion of variance accounted for by the variable or block of variables when entered at the first step in a regression analysis. [b]Unique R^2 within skill = the proportion of variance accounted for by the variable when entered after the same skill in the other language in a regression analysis. [c]Unique R^2 = the proportion of variance accounted for by the variable or block of variables when entered last in a regression analysis. [d]English decoding = mean of English Letter-Word Identification and speeded word reading. [e]Spanish decoding = mean of Spanish Letter-Word Identification and speeded word reading. [f]English oral language = mean of English Picture Vocabulary and Listening Comprehension. [g]Spanish oral language = mean of Spanish Picture Vocabulary and Listening Comprehension.

reading comprehension accounted for by the predictors and theoretically interesting combinations of predictors are shown. When entered simultaneously, the four factors accounted for 56% of the variance in English reading comprehension. The first column in Table 3 displays the proportions of variance accounted for by each of the four factors when entered as the only predictor of English reading comprehension. English decoding independently accounted for the largest proportion of variance. As shown in the middle portion of the first column, the two decoding measures independently accounted for a slightly higher proportion of variance in comparison to the two oral language measures. Finally, the bottom portion of the first column reveals that the two English measures accounted for a much larger proportion of variance when entered together in comparison to the two Spanish measures.

The second column in Table 3 displays the cross-linguistic values, that is, the unique proportion of variance in English reading comprehension accounted for by each factor after accounting for the effects of the same skill in the opposing language. For instance, after accounting for Spanish decoding, English decoding accounted for an additional 30% of the variance. Consideration of the first and second columns allows for the estimation of the amount of shared variance between variables within the two skills. For example, the English decoding factor uniquely accounted for 30% of the variance, the Spanish decoding factor uniquely accounted for 1% of the variance, and two measures combined to account for 48% of the variance. Consequently, 17% of the variance of English reading comprehension was shared between English and Spanish decoding. On the other hand, only 6% of the variance was shared between English and Spanish oral language. The results suggest that cross-language transfer effects are larger for decoding than for oral language but that substantial unique variance is accounted for by within-language predictions for both decoding and oral language.

The third column in Table 3 displays the unique proportion of variance accounted for by each factor when entered after the other three factors. As expected, the results are in accord with the SEM model in Figure 1. When entered at the final step, only English decoding and oral language accounted for significant additional variance. The two decoding measures accounted for more additional variance when entered after the oral language measures than did the oral language measures when entered after the decoding measures. Finally, the bottom portion of the third column reveals that the English measures accounted for an additional 37% of the variance of English reading comprehension after accounting for the Spanish measures. Alternatively, the Spanish measures did not account for further variance after the English measures were entered.

In accord with prior research (e.g., Hoover & Gough, 1990; Proctor et al., 2006), we individually tested all possible Decoding × Oral Language interaction terms in the prediction of English reading comprehension to investigate whether skilled decoders benefited more from higher oral language abilities than less skilled decoders. After accounting for the effects of English and Spanish decoding and oral language, the English Decoding × English Oral Language and the Spanish Decoding × English Oral Language interactions accounted for 2% ($p < .01$) and 1% ($p < .05$) of additional variance, respectively. We decomposed the interactions following the recommendations of Aiken and West (1991). The decompositions revealed that the effect of English oral language was stronger at high levels of English ($\beta = .44$, $p < .001$) and Spanish ($\beta = .43$, $p < .001$) decoding (i.e., 1 *SD* above the means) than at low levels of English ($\beta = .22$, $p < .001$) and Spanish ($\beta = .22$, $p < .001$) decoding (i.e., 1 *SD* below the means). In other words, skilled decoders benefited more from higher English oral language abilities than less skilled decoders. In addition, the English Decoding × Spanish Oral Language and the Spanish Decoding × Spanish Oral Language interactions accounted for 1% ($p < .05$) and 4% ($p < .001$) of additional variance, respectively. The effect of Spanish oral language was positive at high levels of English ($\beta = .11$, *ns*) and Spanish ($\beta = .27$, $p < .01$) decoding and negative at low levels of English ($\beta = -.05$, *ns*) and Spanish ($\beta = -.07$, *ns*) decoding. In agreement with Proctor et al.'s (2006) findings regarding the prediction of English reading comprehension, skilled decoders benefited from having higher Spanish oral language abilities, whereas less skilled decoders did not.

We carried out a parallel set of hierarchical regression analyses predicting Spanish reading comprehension (see Table 4). The four factors accounted for 55%

TABLE 4
Proportions of Variance of Spanish 6th Grade Reading Comprehension Accounted for by the Third-Grade Decoding and Oral Language Measures

	Zero-Order R^{2a}	*Unique* R^2 *Within Skill*[b]	*Unique* R^{2c}
English decoding[d]	.31***	.00	.01
Spanish decoding[e]	.52***	.21***	.05***
English oral language[f]	.06***	.01	.00
Spanish oral language[g]	.29***	.24***	.03***
Decoding measures	.52***	—	.25***
Oral language measures	.30***	—	.03**
English measures	.32***	—	.01
Spanish measures	.54***	—	.23***

Note. R^2 = .55 with the four composite variables entered simultaneously.
[a]Zero-order R^2 = the proportion of variance accounted for by the variable or block of variables when entered at the first step in a regression analysis. [b]Unique R^2 within skill = the proportion of variance accounted for by the variable when entered after the same skill in the other language in a regression analysis. [c]Unique R^2 = the proportion of variance accounted for by the variable or block of variables when entered last in a regression analysis. [d]English decoding = mean of English Letter-Word Identification and speeded word reading. [e]Spanish decoding = mean of Spanish Letter-Word Identification and speeded word reading. [f]English oral language = mean of English Picture Vocabulary and Listening Comprehension. [g]Spanish oral language = mean of Spanish Picture Vocabulary and Listening Comprehension.

of the variance in Spanish reading comprehension when entered simultaneously. As shown in the first column of Table 4, Spanish decoding independently accounted for the largest proportion of variance of Spanish reading comprehension. In addition, the decoding measures independently accounted for more of the variance than the oral language measures and the Spanish measures independently accounted for more of the variance than the English measures.

As shown in the second column of Table 4, only the Spanish decoding and oral language factors accounted for significant additional variance after controlling for the same skill in the opposing language. The first and second columns reveal that 31% of the variance in Spanish reading comprehension was shared between the two decoding measures and 5% of the variance in Spanish reading comprehension was shared between the two oral language measures. As expected from the SEM model, the third column shows that when entered after the other three factors, only Spanish decoding and Spanish oral language accounted for significant unique variance in Spanish reading comprehension. The third column also indicates that the decoding measures accounted for more unique variance than did the oral language measures. Finally, the Spanish measures accounted for additional variance when entered after the English measures, but the English measures accounted for negligible variance when entered after the Spanish variables.

To again investigate whether skilled decoders benefited more from higher oral language abilities than less skilled decoders, we individually tested all possible

Decoding × Oral Language interaction terms in the prediction of Spanish reading comprehension. The Spanish Decoding × English Oral Language interaction accounted for 1% ($p < .05$) of additional variance after accounting for the effects of English and Spanish decoding and oral language. Decomposing the interaction revealed that the effect of English oral language at high levels of Spanish decoding was positive ($\beta = .06$, *ns*), whereas the effect was negative at low levels of Spanish decoding ($\beta = -.16$, *ns*). These findings indicate that skilled decoders benefited slightly from higher English oral language abilities, whereas less skilled decoders did not. The Spanish Decoding × Spanish Oral Language interaction also accounted for 1% ($p < .05$) of additional variance. Decomposing the interaction revealed that the effect of Spanish oral language was stronger at high levels of Spanish decoding ($\beta = .37$, $p < .001$) than at low levels of Spanish decoding ($\beta = .18$, $p < .01$). In other words, skilled decoders benefited more from higher Spanish oral language abilities than less skilled decoders.

DISCUSSION

The findings of our study shed light on the associations between oral language and reading skills in bilingual, biliterate children. The primary issue underlying the study was the extent to which competence in Spanish (i.e., L1) transfers to English (i.e., L2; Bialystok & Hakuta, 1994; Cobo-Lewis et al., 2002; Cummins, 1979; Durgunoğlu, 2002). We examined this first in the third grade for decoding and oral language skills. Previous studies provided evidence for consistently strong associations between word decoding and phonological skills across languages but mixed or negative relations for oral language (e.g., Cobo-Lewis et al., 2002; Comeau et al., 1999; Durgunoğlu et al., 1993; Manis et al., 2004; Ordóñez et al., 2002). Our CFA provided support for distinct decoding and oral language factors in each language, but the decoding factors showed stronger cross-linguistic correlations than the oral language factors.

This pattern of findings has been attributed to the more fixed or rule-bound nature of phonological decoding in alphabetic languages. For example, once a child learns to segment spoken words into phonemes, and associate phonemes with particular letters in Spanish, the metalinguistic understanding of the decoding process, as well as many of the specific associations, should transfer to English. In contrast, oral language skills, involving the learning of verbs, nouns, and other word meanings in different languages, are more diverse and less likely to be represented by a common metalinguistic process or set of rules (Gottardo, Yan, Siegel, & Wade-Woolley, 2001). However, it is likely that particular aspects of oral language, such as cognate awareness and reading comprehension strategies, show higher transfer across languages (Carlisle & Beeman, 2000; Ordóñez et al., 2002). One practical implication of these findings is that children who are weak in phonological awareness or decoding in L1 might be identified as at risk for reading difficulties in L2 with some accuracy (Lindsey et al., 2003). Still higher levels of accuracy might be achieved by ongoing monitoring of reading development (Lundberg, 2002).

A second way in which we investigated cross-linguistic transfer was to fit a model in which sixth-grade English and Spanish reading comprehension factors were predicted by third-grade decoding and oral language. Prior work with Spanish-speaking ELLs indicated that oral language variables accounted for unique variance within-language, after considering decoding (Hoover & Gough, 1990), and that oral language might contribute a small amount of unique variance cross-linguistically to later reading comprehension (Miller et al., 2006; Proctor et al., 2006). Conversely, the results of a longitudinal study in early elementary school indicated that English decoding and oral language skills might completely supplant Spanish decoding and oral language skills as predictors of English reading comprehension (Manis et al., 2004). Our most parsimonious model included paths from English decoding and oral language to later English reading comprehension and paths from Spanish decoding and oral language to later Spanish reading comprehension, but no cross-linguistic paths were found to be significant. The results support and extend earlier work in which L2 variables appeared to completely mediate the contribution of earlier L1 variables (Manis et al., 2004). Because the findings of language-specific prediction occurred for both English and Spanish outcomes, it cannot be argued that the supplanting of Spanish variables by English variables in the prediction of English reading comprehension was because of curricular practices involving a shift from Spanish to English.

Our SEM results conflict with some previous research in which a small but significant contribution of L1 decoding and oral language skills to L2 reading comprehension was found after accounting for the same skills in the children's L2 (e.g., Miller et al., 2006; Proctor et al., 2006). Research has shown that different oral language measures do not produce equivalent cross-linguistic correlations (Ordóñez et al., 2002) and the nonsignificant cross-linguistic effects from our study could be, in part, because of the measures used. In addition, the conflicting results could stem from the analytic strategies (e.g., the use of SEM and composite variables in our study), the longitudinal nature of our study, or differences among the samples.

One additional finding of note in the Grade 3 to Grade 6 predictions was that Spanish oral language accounted for a much smaller amount of the variance of Spanish reading comprehension, in comparison to the amount of variance of English reading comprehension accounted for by English oral language. This finding is consistent with Miller et al.'s (2006) results with a sample of Spanish-speaking ELLs in early elementary school. Miller et al. noted that the need for strong oral language skills to aid in decoding during reading comprehension would be greater in English than Spanish given the relative transparency of Spanish orthography.

Despite the fact that same language variables supplanted cross-language variables in the SEM analysis, it was still important to determine what role, if any, cross-language transfer plays in the development of reading comprehension. In our final set of analyses, we broke down the cross-language predictions of reading comprehension into common and unique variance. The results for the prediction of English reading comprehension considering just the two decoding variables were 30% unique variance for English decoding, 17% common variance, and 1% unique variance for Spanish decoding. In contrast, the results for the two oral language variables were 36% unique variance for English oral language, 6% common variance, and 0% unique variance for Spanish oral language. The findings are in accord with our earlier arguments based on the CFA that decoding skills show a great deal of transfer (i.e., the common variance), and oral language skills do not. In this case, we are dealing with transfer of earlier skills to later reading comprehension. The data support a model in which the most important skills to evaluate in predicting future reading comprehension are within-language skills. Cross-linguistic factors make only an indirect contribution to reading comprehension outcomes, via their common variance with the predictor variables. This argues for a model of dynamic assessment of ELLs, in which the most important assessment is always their current level of skill in L2 (Lundberg, 2002).

Our final set of analyses tested the within- and cross-language Decoding × Oral Language interaction terms. The majority of the interaction terms were significant when predicting English and Spanish reading comprehension, but none accounted for more than 4% of additional variability. Our results for English reading comprehension replicated Proctor et al.'s (2006) finding that skilled decoders in English benefited more from higher Spanish oral language abilities. However, the role of high Spanish oral language was similar for skilled decoders in Spanish. This finding is not surprising given the strong correlation between English and Spanish decoding. Furthermore, English oral language was a stronger predictor of English reading comprehension for better decoders in English and Spanish. Overall, the interaction terms support the proposition that oral language skills become more important predictors of reading comprehension as children become more efficient decoders (Hoover & Gough, 1990).

Limitations

In comparison to some previous research with Spanish-speaking ELLs (e.g., Miller et al., 2006), our study used a moderate-sized sample from only one school district. We did not assess the amount of English used in the participants' classrooms and the participants were transitioned to English-only instruction at different points during elementary school. Hence, the contribution of classroom instruction to reading development, including its precise contribution to the predictor variables, could not be assessed. In addition, our analyses did not incorporate other factors, such as metacognitive knowledge (van Gelderen et al., 2004), comprehension strategy usage (Jiménez, 1997) or working memory (Swanson, Sáez, & Gerber, 2006) that have been shown to be predictors of reading comprehension. These factors may have contributed to the strong correlation between English and Spanish reading comprehension in the sixth grade. Finally, our reliance on latent variable models did not allow us to assess the independent effects of the vocabulary or listening comprehension measures as some previous researchers have done (e.g., Proctor et al., 2006).

Educational Implications

The results highlight the importance of both English oral language and English decoding skills in predicting later English reading comprehension for ELLs. Certain educational practices have been shown to improve skills related to oral language, and this would likely lead to reading comprehension gains. For instance, instructional techniques that emphasize a deeper and more integrated understanding of words have been linked to vocabulary development (Beck, Perfetti, & McKeown, 1982). In addition, research with bilingual children found that the building of background knowledge in their native language before reading an English passage can lead to better vocabulary development (Ulanoff & Pucci, 1999). Nonetheless, the current results suggest that for the sample as a whole, systematic instruction leading to the development of fluent decoding in the L2 would result in improvements in L2 reading comprehension.

Summary

The results of the CFA analyses revealed that the English and Spanish decoding factors were more highly related than the English and Spanish oral language factors. The most parsimonious latent variable model had only within-language paths from the decoding and oral language factors predicting English and Spanish reading comprehension. Finally, the commonality analyses revealed that all of the decoding and oral language variables were significant predictors of English and Spanish reading comprehension. However, the within-language effects were larger than the cross-language effects and the cross-language effects were not significant after accounting for the within-language effects. Future studies could investigate particular aspects of decoding and oral language in more depth to elaborate more on the cross-linguistic findings from the current study regarding the development of reading comprehension in ELLs. Research could also determine whether our results, obtained with children in a transitional bilingual program, generalize to other programs such as English immersion.

ACKNOWLEDGMENTS

This research was supported in part under grant RO3 HD 39488-02 as part of the Biliteracy Research Network, funded by the National Institute of Child Health and Human Development and the Institute of Education Sciences as well as under grant RO1 HD044081-01, funded by the National Institute of Child Health and Human Development.

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