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The Relations between Word Reading, Oral Language, and Reading Comprehension in Children who Speak English as a First (L1) and Second Language (L2): A Multigroup Structural Analysis

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Abstract

This study compared the reading and oral language skills of children who speak English as a first (L1) and second language (L2), and examined whether the strength of the relationship between word reading, oral language, and reading comprehension was invariant (equivalent) across the two groups. The participants included 183 L1 and L2 children (*M* = 9;7 years, *SD* = 3.64 months) in England. As anticipated, there was a significant L1 advantage for oral language (i.e., vocabulary, verbal working memory, sentence repetition) and reading comprehension but not for word reading. Findings from the multigroup structural analysis indicated that the strength of relationships between oral language and reading was relatively invariant across the two groups. Oral language was the strongest predictor of reading comprehension levels in both groups. Finally, the weaker English oral language skills explained the lower performance of L2 learners on reading comprehension. Together the results underscored the importance of supporting oral language development in minority language learners.

Key words: reading comprehension, English as a second language, vocabulary, working memory, sentence repetition, multigroup structural equation modeling

The Relations between Word Reading, Oral Language, and Reading Comprehension in Children who Speak English as a First (L1) and Second Language (L2): A Multigroup Structural Analysis

A substantial body of research evidence suggests that whereas word level reading skills develop relatively rapidly, achieving age-appropriate oral language (e.g., vocabulary) and reading comprehension skills in a majority language continues to be a challenge for a significant proportion of learners from minority language backgrounds who speak a language other than the language of instruction at home (Lesaux, Geva, Koda, Siegel, & Shanahan, 2006). In addition to the differences in oral language and reading comprehension levels, there are reports that the pattern and strength of relations between oral language and reading comprehension may differ between first (L1) and second language (L2) learners (e.g., Droop & Verhoeven, 2003). However, there is a gap in the literature that systematically compares the relations between oral language and reading across the two language groups. Hence, the goal of this study was not only to compare the reading and oral language levels of L1 and L2 learners, but also to examine whether language background (i.e., being an L1 or L2 learner) moderates the relations between oral language and reading. More specifically, the present study examined the relative role of oral language in L1 and L2 reading comprehension. Further research in this area is undoubtedly imperative to promote a better understanding of L2 oral language and reading development and to inform educational practice.

Components of Reading Comprehension: Word Reading and Oral Language

As the well-known simple view of reading postulates, effective reading comprehension requires two essential component skills: accurate recognition of words and linguistic comprehension (Hoover & Gough, 1990). Implicit in the model, linguistic comprehension entails broader oral language processing skills, such as vocabulary, verbal working memory, and morphosyntactic skills. Deciphering the written code into spoken language, understanding the meaning of written words, morphological and syntactic processing of linguistic units, as well as their integration in working memory, are central to reading comprehension. Accordingly, there is an extensive body of research supporting the significant effect of word recognition and oral language processing skills (i.e., vocabulary, verbal working memory, and morphosyntactic skills) on reading comprehension for both L1 learners (e.g., Cain, Oakhill, & Bryant, 2004; Ouellette, 2006) and L2 learners (e.g., Droop & Verhoeven, 2003; Nakamoto, Lindsey, & Manis, 2008). Difficulties in either of these two component skills can contribute to reading comprehension difficulties. For instance, weaknesses within the oral language domain can contribute to reading comprehension difficulties even when children have adequate word recognition skills (Nation, Clarke, Marshall, & Durand, 2004;Swanson, Sáez, Gerber, & Leafstedt, 2004). In fact, among older primary school children, oral language weaknesses seem to be the major source of reading comprehension difficulties (Catts, Tomblin, Compton, & Bridges, 2012).

Although word recognition and oral language skills are distinct component skills with independent contributions to reading comprehension, they are also reciprocally related. Vocabulary knowledge may facilitate word recognition and thereby influence reading comprehension indirectly via word reading skills (Nagy, Berninger, & Abbot, 2006; Tunmer & Chapman, 2012). At the same time, reading is the primary medium through which new vocabulary is acquired. In line with this account, significant relationships between oral language and word reading skills have been reported in both L1 and L2 learners (e.g., Kieffer & Vukovic, 2012; Tunmer & Chapman, 2012).

Comparison of L1 and L2 Learners

Numerous studies have reported that whereas L2 learners performed similarly with their L1 peers regarding word reading, their reading comprehension skills tended to lag behind due to their weaker oral language proficiency in the language of instruction (for a review, see Lesaux, Geva, et al., 2006). For instance, Lervåg and Aukrust (2010) found that Norwegian-speaking L2 students' low vocabulary levels in Norwegian at the beginning of second grade (7;6 years old) was the primary factor that contributed to their underperformance on reading comprehension. Similar results were reported in a study on older L2 students (10;1 years old) in England: weaker oral language skills (i.e., vocabulary and sentence processing skills) in English explained L2 learners' lower performance on reading comprehension over and above nonverbal reasoning and verbal memory skills (Babayiğit, 2014b).

Against this background, it is important to note that not all studies have found an L2 disadvantage in reading comprehension, even when there was evidence of a developmental lag in L2 syntactic or vocabulary skills in English (Chiappe, Glaeser, & Ferko, 2007; Lesaux & Siegel, 2003). These seemingly inconsistent findings have been associated with differences in socioeconomic status (SES), socio-cultural, and educational experiences among L2 learners (Lipka, Siegel, & Vukovic, 2005). The heterogeneity of minority language learners is certainly an important factor that complicates the comparison of research findings across studies but at the same time underscores the importance of further research on L2 learners from diverse educational and socio-cultural contexts.

The component model, as an extension of the simple view of reading, outlines three domains that influence reading comprehension: cognitive (e.g., word recognition, oral language), psychological (e.g., motivation, teacher expectations), and ecological (e.g., SES, language background) (Joshi & Aaron, 2000). Viewed in this way, the component model provides a theoretical framework to examine the interactions between the ecological and cognitive domains of reading development and directly relates to the main research question of the present study (i.e., whether language background moderates the strength of relations between oral language and reading).

Most research in this area has examined the mean performance differences between L1 and L2 students, and only a handful of studies have specifically investigated the extent to which the strength of the relationship (or the magnitude of effect sizes) between oral language and reading varied as a function of language background (e.g., Babayiğit, 2014b; Kieffer & Vukovic, 2012; Lesaux, Lipka, & Siegel, 2006; Lesaux, Rupp, & Siegel, 2007; van Gelderen et al., 2003). For instance, Lesaux, Lipka and Siegel (2006) found that the contributions of verbal working memory and syntactic skills to reading comprehension levels were comparable across L1 and L2 students. Similar findings were reported by Kieffer and Vukovic (2012) with English-speaking L2 students and van Gelderen et al. (2003) with Dutch-speaking L2 students. In contrast, Babayiğit (2014b) found a small, albeit statistically significant, moderating effect of language background: oral language (both vocabulary and sentence processing skills) played a more significant role for L2 reading comprehension than for L1 reading comprehension. Likewise, in Droop and Verhoeven's (2003) study on Dutch-speaking L1 and L2 students, the relationship between vocabulary and reading comprehension tended to be stronger for the L2 group than for the L1 group. Hence, it remains to be clarified whether language background moderates the relationships between reading and oral language, or more specifically, whether oral language plays an even more significant role in L2 learners' reading comprehension.

Present Study

The first aim of this study was to confirm previous findings that there is an L2 gap in English oral language and reading comprehension but not in word reading skills. The second aim was to examine to what degree the strength of the relationships between word reading, oral language, and reading comprehension is invariant across the two language groups. Given the mixed findings, the present study specifically sought to pursue the findings of a previous study suggesting that oral language might play an even more important role in L2 reading comprehension (see Babayiğit, 2014b).

Method

Participants

The participants were 102 L1 (49 boys and 53 girls; mean age = 115.38 months, *SD* = 3.66 months) and 81 L2 (41 boys and 40 girls; mean age = 115.46 months, *SD* = 3.63 months) learners who were recruited from the same classes (year 5) across 7 primary schools in the South West of England. The L1 students did not speak any language other than English at home or have any substantive knowledge of a non-English language. The L2 students spoke at least one language other than English at home. All children with parental consent were tested, except for L2 students who had been in the UK for less than two years. Hence, it was ensured that the results would not be biased by recent arrivals who were at the early stages of learning the English language and had limited experience with the educational system in England. The language of instruction was English, and all schools were following the national curriculum.

The L2 students formed a highly heterogeneous group. Twenty-two different home languages were reported. In line with the national trends, Somali (*n* = 16; 20%), Urdu (*n* = 13; 16%), and Bengali (*n* = 13; 16%) were among the most common home languages (Centre for Information on Language Teaching and Research, 2005).

The L1 and L2 groups did not differ in terms of the distribution of age, t (181) = -.14, p = .89, the ratio of students receiving formal or informal educational support, χ^2 (1) = 2. 061, p = .15, or sex ratio, χ^2 (1) = 0.039, p = .84. However, significantly more L2 students were in receipt of free school meals (FSM): 50.6% of L2 students versus 20.6% of L1 students, χ^2 (1) = 16.86, $p < .001$. Hence, the rate of socioeconomic disadvantage was higher among the L2 students, which reflects the demographic characteristics of minority language students in England (Department for Education and Skills, 2006). Approximately half of the L2 students were born in the UK (51%, n = 41) and most (85%, n = 61) had been attending a primary school in the UK since year 1 (i.e., for about five years). Finally, only three L2 students reported being able to read and write in their home languages.

Tests and Procedure

The tests were implemented in the same order over a minimum of two sessions. The author and a trained research assistant assessed children individually at their schools.

Reading comprehension. The York Assessment of Reading for Comprehension (Form A; Snowling et al., 2009) provides an index of text reading accuracy and reading comprehension levels based on one narrative and one expository passage. Each passage is followed by eight open-ended oral comprehension questions to which children provide oral answers. The comprehension questions assess both literal and inferential comprehension skills and children are free to refer to the passage whilst answering the questions. The parallel-form reliability of text reading accuracy is reported to range between .75 and .93. The reliability of the comprehension scores from the passage-pairs is reported to range between .71 and .84.

Single word reading. The Single Word Reading Test 6-16 (Version 1; Foster, 2007) assesses single word recognition skills independent of text comprehension. Children are asked to read a list of increasingly complex words as accurately as they can (60 words in total). The Cronbach's alpha is reported to be .98.

Sentence repetition. The recalling sentences subtest from the Clinical Evaluation of Language Fundamentals-4[UK] (Semel, Wiig, & Secord, 2006) is essentially a sentence repetition test that assesses sentence memory as well as semantic and syntactic skills. Sentences with increasing length and syntactic complexity are read aloud, and the task is to repeat the sentences back. The testing stops after five consecutive zero scores. The split-half internal reliability indices for age groups between 9 and 11 years are reported to be .92 and .90, respectively.

Vocabulary. The British Picture Vocabulary Scale-II (Dunn, Dunn, Whetton, & Burley, 1997) is a receptive vocabulary test that involves matching a spoken word with one of the four picture options. The testing stops if children make eight or more errors in a given set. For the age groups 9 to 11 years, the Cronbach's alpha and split-half reliability indices are reported to range between .89 and .97.

Verbal working memory. The listening recall subtest from the Working Memory Test Battery for Children (Pickering & Gathercole, 2001) assesses verbal working memory skills. After verifying each spoken sentence as either true or false, the task is to repeat back verbatim the last word of each sentence presented within a block. The number of sentences in each block increases as children progress through the test. The testing stops when children make three or more errors in a given block. The test-retest reliability is reported to be .61 (Gathercole, Pickering, Ambridge, & Wearing, 2004).

Results

Descriptive Statistics and Correlations

Data screening confirmed that there were no outliers or missing scores or violations of the normality of distribution of scores. Table 1 shows a summary of the descriptive statistics and the correlation coefficients between the measures.

Statistical Procedure

The multigroup structural equation modeling (SEM) analysis procedure was used to examine and compare the hypothesised relations between oral language and reading across the L1 and L2 samples. One important advantage of the multigroup SEM method over other traditional methods (i.e., regression) is that it allows for comparison of means and the strength of relations across the groups in a systematic way while taking into account measurement error (Vandenberg & Lance, 2000). Hence, it is envisaged that use of a more powerful statistical approach would serve to overcome the shortcomings of previous studies using regression methods (e.g., Babayiğit, 2014b).

Preliminary considerations. The Analysis of Moment Structures (AMOS 19; Arbuckle, 2010) programme was used for all the analysis. The model fit was assessed by the chi-square fit index (χ^2), Bentler's comparative fit index (CFI), and the root mean square error of approximation (RMSEA). Chi-square provides an index of the discrepancy between the observed data and the hypothesised model. Therefore, a small and nonsignificant chi-square value suggests a better model fit. The CFI values range between .00 and 1.00, and those closer to 1.00 (i.e., .95 and above) indicate a very good fit (Bentler, 1990). Likewise, the RMSEA values ranging between .00 and .08 suggest an adequate model fit and smaller values below .05 suggest a good fit (Browne & Cudeck, 1993).

The hypothesized model examined the contributions of word reading and oral language latent factors to reading comprehension levels. Given the reports of significant relationships between word reading and oral language skills, the two latent factors were anticipated to correlate with each other. The three indicator measures of the oral language latent factor were vocabulary, sentence repetition, and verbal working memory. The word reading latent factor included two indicator measures of single word reading accuracy and text reading accuracy. Receiving FSM was included in the model as a control measure of socioeconomic status.

Prior to the multigroup SEM analysis, the model fit to the data from each language group was tested separately. The hypothesised model yielded extremely good fit indices for both groups, L1, χ^2 (10, N = 102) = 10.195, p = .424, CFI = .999, RMSEA = .014, with 90% CI = .000 to .109; L2, χ^2 (11, N = 81) = 4.226 p = .963, CFI = 1.000, RMSEA = .000, with 90% CI = .000 to .000. A negative error variance estimate for L2 text reading accuracy was observed. This is referred to as a Heywood case, which is not uncommon when testing latent factors with two indicator measures. Following the recommendations, the error variance was fixed to zero (Kline, 2011, p. 158), which solved the problem. Having established that the model was a good fit to the observed data from both groups, it was possible to move onto the next stage and examine the model fit to the pooled data across the two groups (Kline, 2011).

Multigroup SEM analysis. The language group mean differences and the invariance of direct paths from oral language and word reading to reading comprehension (i.e., differential slopes) were the major interest of the present study. However, prior to conducting a meaningful comparison of the direct path coefficients across groups, it is essential to establish that a) the unconstrained model fits to the pooled data from the two samples and b) the factor loadings, the measurement error variances, the factor variances, and factor covariance are invariant across groups, respectively (Vandenberg & Lance, 2000). The unconstrained model assesses whether the hypothesised relations explain the pooled data from the two groups when the parameter values are estimated freely across the groups. Hence, the unconstrained model acts as a baseline model. The invariance of factor loadings, measurement error variances, factor variances, and factor covariance are tested by constraining the relevant parameter values to be equal across the two groups. In this context, if constraining a set of parameter values yields a nonsignificant change in model fit, it means that the parameter values are comparable across groups and need not be estimated separately for each group. A nonsignificant chi-square difference ($\Delta\chi^2$) value and a ΔCFI value equal or smaller than the absolute value of .01 indicate that the two nested models are invariant (Cheung & Rensvold, 2002). It is permissible to release a small set of parameters, which are not critical for the purposes of the study, to be estimated freely across the groups and proceed with the multigroup SEM analysis (Byrne, 2004; Kline, 2011; Vandenberg & Lance, 2000). Hence, in line with the guidelines of Vandenberg and Lance (2000), a series of nested models examined the mean and slope differences across the two language groups.

The Results of the Tests of Model Invariance

The unconstrained model yielded excellent model fit indices, χ^2 (21) = 14.416, p = .851, CFI = 1.000, RMSEA = .000 with 95% CI = .000 to .036. Figure 1 depicts a summary of the standardized estimates for the L1 and L2 groups. The unstandardized estimates have been summarised in Table 2. All standardized factor loadings were .7 or larger and significant at $p <$ .001 in both groups. The composite factor reliability coefficient of rho for the word reading and oral language latent factors was .909 and .749 for the L1 group, and .958 and .799 for the L2 group, respectively. Hence, all rho values were larger than the recommended .70 criterion providing support for the construct reliability of the factors in both language groups (see Kline, 2011).

As shown in Figure 1, the direct path coefficients from oral language to reading comprehension were very large and highly significant in both groups (β_{L1}= .72 and β_{L2} = .86, *p*s< .001). In contrast, the direct path coefficients from word reading to reading comprehension were small in both groups and failed to reach statistical significance for the L2 group (β_{L1}= .19, *p* = .030 and β_{L2} = .01, *p* = .938). As indicated in Table 2, receiving FSM was not significantly related to any measure. Therefore, and in order to simply the presentation, the relevant paths are not shown in Figure 1. Finally, the model explained a very large proportion of the reading comprehension variance in both groups: 70% in L1 and 75% in L2, *p*s< .001.

As the unconstrained model was a good fit to the data, it was possible to proceed with the test of the invariance of factor loadings, which yielded a marginally significant $\Delta\chi^2$ value (*p* = .045) but the CFI value did not change at all (Model 2, Table 3). The modification indices (provide an estimate of how much the χ^2 value will decrease if the equality constraint on a set of parameters are to be removed) indicated that the regression weight from oral language to sentence repetition was slightly larger in the L1 group. Indeed, releasing the factor loading for sentence repetition to be estimated freely yielded a nonsignificant $\Delta\chi^2$ value. Therefore, the model with *partial equal factor loading* was retained in the analysis (Model 3, Table 3).

Next, the invariance of the intercepts was tested by fixing the intercepts to be equal on all observed measures. This is essentially a test of group mean differences on the observed measures. Constraining the intercepts to equality led to a significant change in model fit (Model 4, Table 3). The analysis of modification indices and residuals revealed that it was essential to remove the equality constraint on the intercepts of the three oral language indicators and reading comprehension for a nonsignificant change in model fit (Model 5, Table 3). This result confirmed that there was a statistically significant L1 advantage in oral language and reading comprehension (see Appendix for a summary of the standardized group mean differences).

Then, the extent to which weaker oral language skills explained the L2 underperformance on reading comprehension was examined. For this purpose, the intercepts of oral language indicators (but not word reading) and reading comprehension were constrained to equality and compared with a model with equality constrained oral language indicator intercepts but freely estimated reading comprehension intercepts. These two models were not significantly different from each other, $\Delta\chi^2$ (1) = 0.012, p = .913, Δ CFI =.001. Hence, when the three oral language intercepts were fixed to be equal across groups, the group mean difference in reading comprehension became nonsignificant. It is noteworthy that the noninvariant intercepts (i.e., mean group differences) have no consequence for the tests of the invariance of direct paths (Kline, 2011; Vandenberg & Lance, 2000). The tests of invariance of variances and covariances (i.e., the measurement error variances, factor variances, factor covariances, and the disturbance variances) yielded a nonsignificant difference in model fit (Model 6, Table 3)[1]. Therefore, it was possible to proceed with the test of invariance of direct paths. The model with the equality constrained direct paths yielded a nonsignificant change in model fit suggesting that the magnitude of direct path coefficients was comparable across the L1 and L2 groups (Model 7, Table 3).

Discussion

The present study extended previous research (for a review, see Lesaux et al., 2006) by examining L1 and L2 students' oral language and reading skills, as well as the possible moderating effect of language background on the relations between oral language and reading. As anticipated, L1 and L2 students performed at similar levels on word reading but there was an

L2 disadvantage in oral language and reading comprehension. Oral language was the most powerful predictor of reading comprehension for both groups. Although the strength of the relationship between oral language and reading tended to be stronger for the L2 group than for the L1 group, the group difference was not statistically significant.

Language Group Mean Differences

The multigroup structural analysis confirmed that the five observed measures assessed oral language processing skills and word reading skills similarly across the two language groups, supporting the reliability and validity of the observed group mean differences in this study. In accordance with previous reports (e.g., Babayiğit, 2014b), there was an L2 disadvantage in oral language but not in word reading. Most importantly, the results showed that when controlling for L1 and L2 differences in oral language, the L2 disadvantage in reading comprehension disappeared. Thereby, the findings provided further support for previous results that the weaknesses in English oral language skills underlie the L2 disadvantage in reading comprehension (Babayiğit, 2014b; Kieffer & Vukovic, 2012).

The Relations between Oral Language, Word Reading, and Reading Comprehension

The hypothesised model was a good fit to the data from both language groups suggesting that the model was equally good at explaining the hypothesised relationships in both the L1 and L2 groups. Oral language emerged as the most powerful predictor of reading comprehension in both language groups, further confirming the central role of oral language skills in reading comprehension. Additionally, the findings provided support for previous literature that oral language contributes to reading comprehension directly as well as indirectly through its relationship with word reading. At this point, it is noteworthy that text reading accuracy and single word reading accuracy were also strongly related to the reading comprehension levels of both groups as evidenced by the large correlation coefficients between these measures (Table 1). Hence, the small path coefficients from the word reading factor to reading comprehension suggest that the unique effect of word reading on reading comprehension was largely explained by its strong relationship with oral language. This is a common finding among older primary school pupils, and similar results have been previously reported (e.g., Kieffer & Vukovic, 2012). Therefore, it should be noted that for younger primary school pupils the results might have been different, as the effect of word recognition skills on reading comprehension tends to be larger for younger age groups (e.g., Tilstra, McMaster, van den Broek, Kendeou, & Rapp, 2009).

Comparison of Relations across L1 and L2 Groups

In this study, there was no statistically significant evidence to suggest that language background moderated the relations between oral language and reading comprehension. Hence, the findings provided support for two studies also reporting comparable relationships across the English-speaking L1 and L2 learners (e.g., Kieffer & Vukovic, 2012; Lesaux, Lipka, et al., 2006). That said, although nonsignificant, the path coefficients from oral language to word reading and reading comprehension were larger in the L2 group - a consistent trend, which paralleled a previous study (i.e., Babayiğit, 2014b). Therefore, the results from this study did not entirely contradict those from a previous study with a different sample of students (i.e., Babayiğit, 2014b). However, given the small differences in parameter values in both studies and the nonsignificant group differences in this study, there is no robust evidence thus far for a differential role of oral language in the reading performance of the two language groups. As discussed in more detail in the next section, further research is needed to rule out any possible methodological issues that might underlie these inconsistencies.[2]

Nonetheless, clearly the most robust finding was observed in the effect of ecological domain (i.e., the language background) on reading comprehension and oral language levels (see Joshi & Aaron, 2000). L2 students' English oral language skills, as assessed by measures of vocabulary, sentence repetition, and verbal working memory, tended to be weaker, which in turn seemed to undermine their effective comprehension of written text in English.

Limitations and Further Research

Several important caveats need to be taken into account when evaluating the present findings. As with any multigroup SEM analysis, the observed parameter differences may not correspond with the general population. In this study, almost 50% of the L2 learners came from low SES backgrounds. Therefore, it is vitally important to confirm the present findings with L2 students from diverse socioeconomic backgrounds and whilst taking into account possible language or ethnic group differences (Roberts, Mohammed, & Vaughn, 2010). Although, it is important to examine a heterogeneous group of L2 learners, who comprise increasingly diverse classrooms, it is important to recognise that there are likely to be important differences between the subgroups of L2 learners from different linguistic and socio-cultural backgrounds. For instance, the linguistic features of the mother tongue may influence L2 children's development of English language and literacy skills in a multitude of ways that remain to be clarified (see Goodrich, Lonigan, & Farver, 2013).[3] Factors such as the time of exposure to the English language (Kieffer, 2008) and the home language proficiency (Bedore & Peña, 2008) may also influence the developmental trajectories of L2 students and thereby the pattern of relations between reading and oral language skills.

It is widely acknowledged that along with the time of assessment (Tilstra et al., 2009), as noted previously, the specific demands of a reading comprehension test can influence the strength of relations between word reading, oral language, and reading comprehension (Francis et al., 2006; Cutting & Scarborough, 2006). Hence, future research needs to confirm these findings with multiple measures of reading comprehension and oral language skills across a wide range of age groups. The use of multiple reading comprehension measures, while not possible in this study due to time constraints, will also make it possible to construct a latent variable for reading comprehension and thereby take into account measurement error.

One way to extend the current findings, which are essentially correlational in nature, is to examine the extent to which language background moderates the response-to-interventions that target oral language skills. This would make it possible to elucidate to what extent the L2 gap in oral language and reading comprehension might be bridged by additional language input and whether the L1 and L2 groups would benefit from such an intervention or enrichment programme to the same extent.

Finally, there is a clear need for future research to examine other important aspects of the cognitive and psychological domains of reading comprehension, such as background knowledge, comprehension strategies, and teacher expectations (see Joshi & Aaron, 2000). Thus far, these important factors remain highly under-researched in L2 populations.

Educational Implications and Conclusion

Together the findings highlight that even after about five years of formal schooling in English, a significant proportion of L2 students may not be able to catch up with their native-speaking L1 peers on key aspects of oral language processing skills thereby creating a developmental gap in English oral language and undermining their effective comprehension of written text. It is not entirely clear when the L1 and L2 gap in reading comprehension is likely to close. One study followed Spanish-speaking L2 students from the fifth (10-11 years old) to the seventh grade (12-13 years old) and found that the L2 students did not catch up with their L1 peers in reading comprehension (Mancilla-Martinez, Kieffer, Biancarosa, Christodoulou, & Snow, 2011). There are also reports of reading comprehension development slowing down at higher grade levels (Nakamoto, Lindsey, & Manis, 2007) suggesting that it may become even more difficult for students with lower scores to catch up, especially given increasing text complexity at higher grade levels. In fact, there is evidence that poor readers from low SES backgrounds irrespective of their language background are less likely to catch up, as they progress through the school system (e.g., Kieffer, 2012), hence the importance of addressing the L2 gap in reading comprehension as early as possible. In conclusion, given the high stability in reading comprehension development over time and the central role of oral language processing skills not only in reading comprehension, but also across the curriculum, the findings from this study call for concerted efforts to meet the challenges of delivering programmes to support the oral language development of children, which at the same time can help to bridge the developmental gaps associated with minority language background.

Appendix

Standardized Mean Differences in Reading and Oral Language Scores

(First Language Learners Minus Second Language Learners)

Measures	Cohen's *d*
Reading comprehension	.66**
Text reading accuracy	.17
Single word reading	.04
Vocabulary	.92**
Sentence repetition	.76**
Verbal working memory	.39*

* $p < .01$. ** $p < .001$.

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Footnote

[1] Note that as the error variance for the text reading accuracy was fixed to zero in the L2 group, it was considered more appropriate to keep text reading error variances outside the invariance test.

[2] Although caution needs to be exercised when comparing findings from reading comprehension and text writing, it is noteworthy that similar invariant relations between verbal skills and text writing have been reported in a previous study (Babayiğit, 2014a).

[3] In this study, three L2 students could read or write in their home languages, hence it was unlikely that the orthography of the home language would have had any effect on the L2 students' reading comprehension performance in English.

Table 1 Summary of Correlation Coefficients Between the Measures, Means, and Standard Deviations as a Function of Language Group

	1	2	3	4	5	6	7	L2	*M*	*SD*
1. Reading comprehension	-	.65***	.60***	.74***	.69***	.64***	.15		93.52	10.75
2. Text reading accuracy	.55***	-	.93***	.65***	.58***	.54***	.22*		97.40	13.13
3. Single word reading	.52***	.84***	-	.59***	.53***	.51***	.16		99.10	15.01
4. Vocabulary	.70***	.41***	.47***	-	.65***	.63***	.14		86.70	15.54
5. Sentence repetition	.69***	.43***	.47***	.70***	-	.64***	.15		5.69	02.95
6. Verbal working memory	.55***	.28**	.29**	.52***	.64***	-	.07		90.49	17.60
7. Free school meals	.15	.14	.11	.16	.14	.11	-		0.49	0.50
L1										
M	100.40	99.52	99.65	99.45	8.02	97.07	0.79			
SD	10.15	12.28	15.62	12.46	3.14	16.47	0.41			

Note Intercorrelations for the second language (L2) learners are presented above the diagonal ($n = 81$) and those for the first language (L1) learners are presented below the diagonal ($n = 102$).

* $p = .053$. ** $p < .01$. *** $p < .001$.

Table 2 Summary of Unstandardized Parameter Estimates

Parameter			L1 UnStd	L1 *SE*	L2 UnStd	L2 *SE*
Factor loadings						
Word reading	→	Text reading accuracy	0.794***	0.083	0.945***	0.043
Word reading	→	Single word reading	1.000[a]	-	1.000[a]	-
Oral language	→	Sentence repetition	0.238***	0.032	0.177***	0.025
Oral language	→	Vocabulary	0.904***	0.125	0.985***	0.128
Oral language	→	Verbal working memory	1.000[a]	-	1.000[a]	-
Direct effects						
Oral language	→	Reading comprehension	0.645***	0.105	0.696***	0.126
Word reading	→	Reading comprehension	0.132*	0.061	0.008	0.096
FSM	→	Reading comprehension	-0.064	1.598	0.167	1.514
Covariance						
Oral language ↔ Word reading			88.713***	22.651	136.102***	30.218
FSM ↔ Word reading			0.799***	0.603	1.493	0.792
FSM ↔ Oral language			0.787***	0.504	1.047	0.816

	L1		L2	
Parameter	UnStd	*SE*	UnStd	*SE*
Factor variances				
Oral language	126.488***	33.780	174.024***	45.362
Word reading	200.186***	37.646	190.888***	34.803
Error variances				
e1 Text reading accuracy	23.099*	11.298	0[b]	-
e2 Single word reading	41.297*	18.133	31.645***	5.000
e3 Vocabulary	50.182***	9.799	69.518***	15.195
e4 Sentence repetition	2.581*	0.582	3.187***	0.620
e5 Verbal working memory	142.007***	22.617	131.757***	24.296
FSM	0.163***	0.023	0.250***	0.039
D Reading comprehension	30.961***	5.807	28.321***	7.162

Note L1= first language learners; L2= second language learners; UnStd = Unstandardized parameter estimates; [a] = reference indicator (not estimated); FSM = free school meals; [b] = error variance was fixed to zero; D = disturbance variance.

* $p < .05$. ** $p < .01$. *** $p < .001$.

Table 3 Summary of the Model Fit Indices from Multigroup Invariance Tests

Model	Model comp	χ^2	*df*	*p*	CFI	RMSEA (90% CI)	$\Delta\chi^2$	Δ *df*	*p*	ΔCFI
1. Unconstrained	-	14.416	21	.851	1.000	.000 (.000 - .036)	-	-	-	-
2. Equal factor loading	1	22.471	24	.551	1.000	.000 (.000 - .056)	8.055	3	.045	.000
3. Partial equal factor loading	1	16.702	23	.824	1.000	.000 (.000 - .038)	2.286	2	.319	.000
4. Equal intercept	3	64.430	29	< .001	.952	.082 (.055- .109)	47.727	6	< 001	.048
5. Partial Equal Intercept	3	20.489	25	.721	1.000	.000 (.000- .046)	3.787	2	.151	.000
6. Equal variance and covariance	5	32.199	33	.507	1.000	.000 (.000- .053)	11.710	8	.165	.000
7. Equal direct path	6	33.467	35	.542	1.000	.000 (.000- .050)	1.268	2	.531	.000

Note N = 183. Model $_{comp}$ = comparison model; CFI = comparative fit index; RMSEA = root mean square error approximation; CI = Confidence interval.

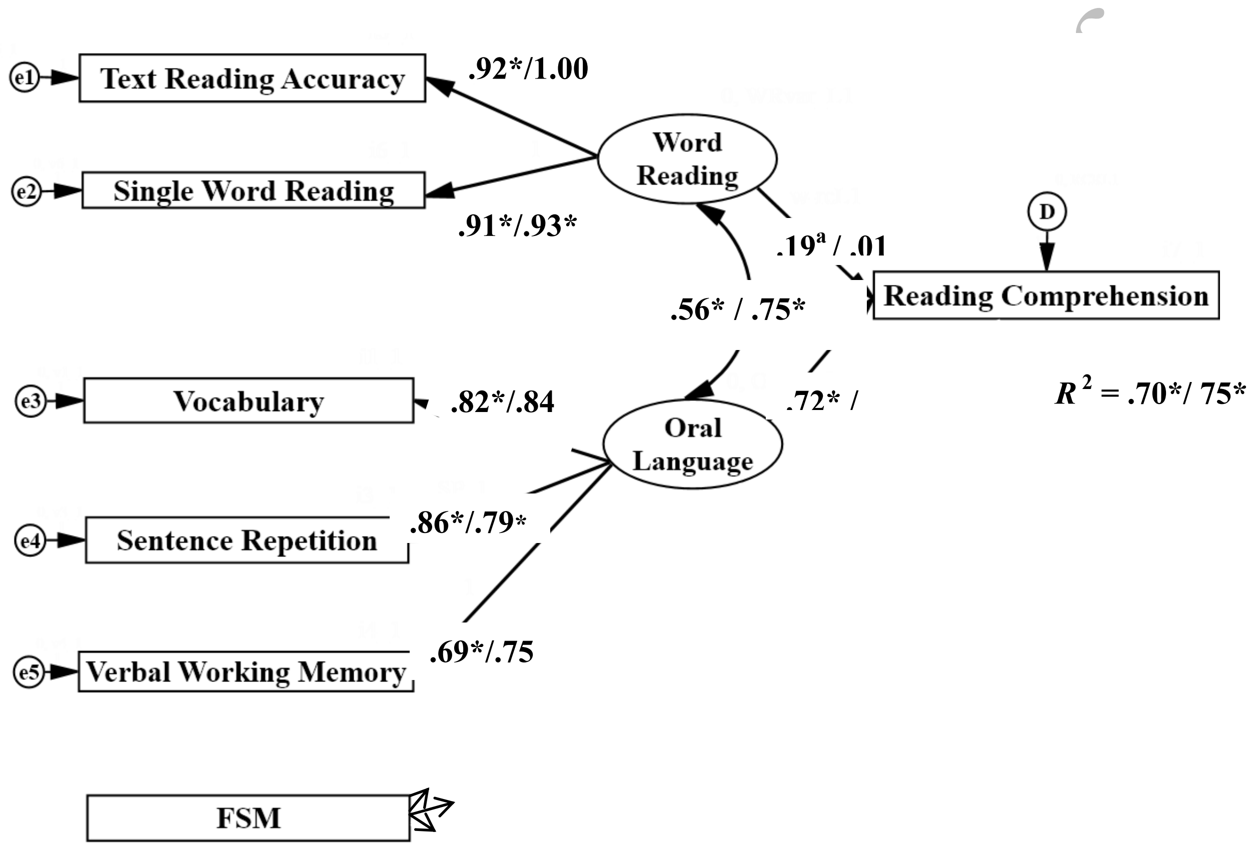

Fig 1 Multigroup structural equation modeling comparing the strength of relations between word reading, oral language, and reading comprehension across learners with English as a first (L1) and second language (L2). The standardized parameter estimates have been presented (L1/L2). R^2 = total explained variance.

[a] $p < .05$. * $p < .001$.