Reading Anxiety, Engagement, and Achievement: A Comparison of Emergent Bilinguals and English Monolinguals in the Elementary Grades

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Abstract

Socio-emotional constructs have been receiving increased attention as contributors to children's literacy development. However, in comparison to positive socio-emotional constructs, negative socio-emotional constructs have been understudied with respect to their role in reading achievement in both dual language learners (DLLs) and English speakers (ESs). The present study addressed this gap by examining reading anxiety in 339 DLLs, who primarily spoke Spanish as their first language, and 178 ESs in Grades 3-5 using a latent variable approach. Structural equation modeling (SEM) was used to form latent variables for reading anxiety, reading engagement, and reading achievement, compare latent variable means for DLLs and ESs, and examine relations among the three focal constructs across the two language groups. The DLLs and ESs showed similar levels of reading anxiety and reading engagement, although the ESs showed stronger reading achievement. Further, for both DLLs and ESs, reading anxiety related negatively to reading achievement, both directly and indirectly through reading engagement, controlling for grade level. However, both the direct and indirect effects were greater for DLLs than ESs. In the discussion, we interpret these results in the context of theoretical views of the potential mechanisms linking reading anxiety and achievement, giving attention especially to the multidimensional nature of reading engagement and the possible role of stereotype threat. Based on the current findings and other recent research, we conclude by contending that reading anxiety merits increased scrutiny by researchers and educators endeavoring to understand and strengthen children's reading achievement.

Reading Anxiety, Engagement, and Achievement: A Comparison of Dual Language Learners and English Speakers in the Elementary Grades

Reading achievement depends on coordination among complex linguistic, cognitive, and socio-emotional processes within a particular ecological context (Aaron, Joshi, Godoen, & Bentum, 2008; Orellana García, 2018). While a plethora of studies in the field of literacy has focused on the linguistic and cognitive dimensions of reading, less but increasing attention has been paid to the socio-emotional elements, such as motivation, emotions, and engagement (Taboada Barber & Klauda, 2020; Toste, Didion, Peng, Filderman, & McClelland, 2020). These elements, however, may be equally as important as the linguistic and cognitive, and deeply entwined with them, in individuals' literacy development (Jalongo & Hirsch, 2010) and in their contribution to variance in reading performance (Taboada, Tonks, Wigfield, & Guthrie, 2009). In particular within the socio-emotional realm, positive constructs such as intrinsic motivation, interest, and self-efficacy, have been explored as correlates and facilitators of literacy (see Schiefele, Schaffner, Möller, & Wigfield, 2012). Fewer studies have focused on the role of negative socio-emotional elements, such as devaluing of reading or reading anxiety, although extant work suggests that negative motivations and emotions may make unique contributions to reading achievement beyond positive socio-emotional dimensions (Guthrie, Klauda, & Ho, 2013) and may in fact be stronger predictors of reading achievement than the positive (Chapman & Tunmer, 1995; Ramirez, Fries, et al., 2018).

In particular, the limited attention given to the role of reading anxiety in reading achievement is surprising, given that anxiety is one of the most commonly experienced emotions in academic settings (Pekrun, Goetz, Titz, & Perry, 2002), and that subject-specific anxiety has been established as a strong – and malleable – predictor of achievement in other subjects, namely

math (Pekrun, Lichtenfeld, Marsh, Murayama, & Goetz, 2017; Ramirez, Shaw, & Maloney, 2018). Recently there has been a call for more rigorous and specific investigations of how anxiety and other emotions contribute to second language learners' language and literacy development, in order to better inform efforts to facilitate individuals' second language development (Shao, Pekrun, & Nicholson, 2019). Studies focused on reading anxiety in first language (L1) learners, including native English speakers (ESs), have also been identified as a priority for research on factors that may contribute to children's reading performance (Piccolo et al., 2017). The present study addresses these calls by focusing on anxiety specific to the domain of reading in two groups of U.S. third- to fifth-graders: Dual Language Learners (DLLs) who primarily speak Spanish as their first language while learning English as their second, and their ES counterparts. Reading anxiety as a factor contributing to reading achievement in DLLs especially deserves attention. DLLs – 74.8% of whom, in the United States, speak Spanish as their first language (National Center for Education Statistics, 2020) – struggle with reading (Mancilla-Martinez & Lesaux, 2010), with more than twice as many (65%) performing below the basic reading level compared to their ES peers (29%; National Assessment of Educational Progress, 2019). While several studies have focused on the cognitive and linguistic dimensions of DLLs' reading, with an eye toward identifying targets for intervention that may improve DLLs' reading, few have examined the role that socio-emotional dimensions, which are also potentially malleable, may play in it (e.g., Taboada Barber, Buehl & Beck, 2017; Taboada Barber, Klauda, & Stapleton, 2020). In particular, it is an open question how and to what extent anxiety about the processes and outcomes of reading may relate to DLLs' reading difficulties. To address this gap in the literature this study examines (a) the extent to which DLLs report experiencing reading anxiety as compared to ESs and (b) whether reading anxiety relates

similarly to reading achievement in both groups, including whether reading engagement mediates their relations.

Reading Anxiety and Reading Engagement

We define *reading anxiety* as an achievement emotion of fear or worry linked to situations that entail processing textual information (Ramirez, Fries, et al., 2018; Wallbrown, Brown, & Engin, 1978), occurring along a continuum in typically developing and struggling readers (Katzir, Kim, & Dotan, 2018). This definition captures the fact that children may feel anxious about varied reading skills (e.g., word recognition, reading comprehension) and activities (reading aloud to the class, taking a reading test). It also constrains our focus to anxiety tied directly to reading activities, rather than to general anxiety, which has been found to be distinct from, though, associated with reading anxiety (Zbornik, 1988; Zbornik & Wallbrown, 1991). From a behaviorist view, reading anxiety is thought to develop through a process of classical conditioning, as a reading activity (e.g., reading aloud) is initially a neutral stimulus, but becomes paired repeatedly over time with unpleasant situations (e.g., negative teacher comments, peer teasing), ultimately producing a conditioned anxious response to reading (Jalongo & Hirsch, 2010). From a socio-cognitive perspective, however, reading anxiety's development depends on how students *interpret* or appraise past reading experiences and outcomes (Ramirez, Fries, et al., 2018; Ramirez, Shaw, & Maloney, 2018). Students who believe their performance is due to their lack of competence and that their ability is immutable are more prone to reading anxiety than those who attribute their performance to lack of effort or to task difficulty.

Reading engagement refers to active, focused involvement in reading-related activities. In agreement with the multidimensional view of reading engagement (Guthrie & Wigfield, 2000)

and academic engagement more broadly (Fredricks, Blumenfeld, & Paris, 2004; Pekrun & Linnenbrink-Garcia, 2012), we view it as having cognitive, behavioral, affective, and social components. For instance, students who are more engaged in reading apply reading strategies and think deeply about text content, devote time to reading and persist when they face challenges with text, read because they feel confident about it and enjoy it, and read or discuss their reading with others. Two studies to date have found that teachers rated elementary-aged DLLs equally in levels of reading engagement (Taboada Barber, Cartwright, et al., 2020; Taboada Barber, Klauda, & Stapleton, 2020).

According to the reading engagement framework, positive engagement in reading is fostered by positive reading motivations (i.e., beliefs, feelings, and goals about reading), and, in turn, reading engagement fosters reading achievement, as it helps individuals build and reinforce the skills and strategies that enable successful reading experiences. In contrast, disengagement, or avoidance and minimization of effort in reading, is engendered by negative reading motivations, and diminishes reading achievement (Guthrie & Klauda, 2016; Guthrie & Wigfield, 2000).

The exploration of reading engagement and motivation in relation to reading achievement has taken different directions in the last decade, especially when it comes to DLLs. For example, findings have shown that the dynamics and indicators of engagement are similar for DLLs and their ES peers in the middle grades (e.g., Taboada Barber et al., 2017), with behavioral and cognitive engagement playing a strong role in predicting achievement in Grade 6 students. Others have explored reading engagement as a mediator of relations of cognitive and language variables with reading comprehension in DLLs in middle school (Taboada, Townsend, & Boynton, 2013) and DLLs and ESs in the elementary grades (Taboada Barber, Klauda, &

Stapleton, 2020) finding that engagement plays both a direct and indirect role in the prediction of comprehension. Lastly, specific dimensions of motivation (e.g., self-efficacy) have also been found to predict reading achievement (Proctor, Daley, Louick, Leider, & Gardner, 2014) in students with reading disabilities, in contrast to other dimensions of motivation (e.g., extrinsic motivation), and to do so equally for DLLs and ESs . However, neither this work, nor the reading engagement framework address reading anxiety as a key variable in models of reading achievement. This study takes a first step in that direction.

How Anxiety Affects Achievement: Theoretical Views

How does reading anxiety play into reading engagement and achievement? In the control-value theory of achievement emotions (e.g., Pekrun, 2016; Pekrun & Linnenbrink-Garcia, 2012), achievement emotions are directly influenced by individuals' perceptions of control and valuing of achievement activities; anxiety, in particular, appears to derive from valuing an activity highly but feeling that success in it is out of one's control. Emotions, in turn, directly influence engagement and achievement in certain ways. For instance, anxiety, categorized as a negative activating emotion, or a type of emotion that energizes a negative response in achievement situations, is associated specifically with a "flight" or avoidance response, whereas anger, another negative activating emotion, is associated with a "fight" or approach response (Pekrun & Linnenbrink-Garcia, 2012). In general, negative activating emotions appear to interfere with positive engagement in learning situations, engendering negative effects on achievement.

However, for some students, in some contexts, and in small amounts, negative activating emotions like anxiety may instead be linked positively with achievement (Pekrun & Linnenbrink-Garcia, 2012; Tulis & Fulmer, 2013). For instance, anxiety has also been found sometimes to spur individuals' efforts to increase effort investment to avoid failure, a form of

extrinsic motivation (Pekrun & Linnenbrink-Garcia, 2012). Given a substantial amount of work on reading motivation indicating that extrinsic motivation is negatively associated with reading achievement (or, otherwise, not associated with it; e.g., Schiefele et al., 2012; Unrau & Schlackman, 2006), we believe that if reading anxiety spurred the extrinsic motivation of failure avoidance, this, in turn, might increase behavioral engagement. But in this case, behavioral engagement might be disconnected from, or negatively associated, with reading achievement.

Additionally, achievement anxiety may energize the use of rigid learning strategies, like rote memorization, which may benefit some simple learning tasks (Pekrun & Linnenbrink-Garcia, 2012). More complex tasks, however, like reading, which require the coordination of complex cognitive skills (Elleman & Oslund, 2019), including general domain skills, such as executive function skills (e.g., working memory, cognitive flexibility, and inhibition; Butterfuss & Kendeou, 2018; Follmer, 2018), may be particularly susceptible to impairments in efficiency due to anxiety (Derakshan & Eysenck, 2009). This view is consistent with the *disruption account* of relations between academic anxiety and achievement, originally conceptualized in the domain of math (e.g., Ashcraft & Faust, 1994; Park, Ramirez, & Beilock, 2014) and which has recently been extended to reading (Ramirez, Fries et al., 2018). Ramirez, Fries, et al. suggest that reading anxiety may affect reading achievement by reducing engagement. However, albeit they point to the potential mediating role of engagement between reading anxiety and achievement, this was not tested empirically, nor, to our knowledge, has it been tested by others the field of literacy research. In work in the math domain, however, the disruption account emphasizes that anxiety causes intrusive thoughts and ruminations, especially about the consequences of failure in achievement tasks. Dealing with these thoughts is believed to demand substantial cognitive resources, and thereby diminish the working memory resources needed for successful

mathematical problem solving (Ramirez, Shaw, & Maloney, 2018). We hypothesize that reading engagement, construed as described above in a multidimensional manner, may mediate relations between reading anxiety and reading achievement (conceptualized as latent variable comprised of word decoding and reading comprehension) in elementary school-aged DLLs and ESs.

Relations of Reading Anxiety, Engagement, and Achievement in DLLs and ESs

Most research on reading anxiety has focused on reading in a foreign language course, as opposed to reading in one's first language or reading in one's second language as a DLL (Piccolo et al., 2017). This work indicates that reading anxiety is distinct from anxiety about language learning in general (Saito, Garza, & Horwitz, 1999) or about other aspects of language learning (speaking, writing, and listening) (Cheng, 2017; Mills, Pajares, & Herron, 2006). Further, higher levels of reading anxiety, especially among beginning versus more advanced language learners, have been associated with poorer performance on reading tasks, with most research conducted with middle school through university students (e.g., Brantmeier, 2005; Guimba & Alico, 2015; Mohammadpur & Ghafourinia, 2015; Rajab, Zakaria, Rahman, Hosni, & Hassani, 2012).

Reading anxiety in students learning English as a foreign language and as DLLs may stem from similar sources, such as the variability of sound-symbol correspondences in English impeding word recognition and unfamiliar cultural material impeding comprehension (Saito et al., 1999). For DLLs, however, anxiety may be especially salient and have greater consequences, as they must learn to read and comprehend English in order to succeed in all academic subjects and as they must use their developing English reading skills alongside their native English-speaking peers. Although a few studies in the last decade have explored reading engagement and motivation in DLLs (e.g., Taboada et al., 2013; Taboada Barber et al., 2017; Taboada Barber, Klauda, & Stapleton, 2020), to date, however, no known studies have examined the extent to

which DLLs compare to other language groups in levels of anxiety specific to reading. In addition, no known studies have examined how reading anxiety relates to DLLs' reading engagement and achievement.

Regarding reading and anxiety in ESs and learners of a first language besides English, more work has focused on relations between general anxiety – as opposed to reading anxiety specifically – and reading achievement, with attention particularly given to individuals with reading disabilities, rather than anxiety's occurrence among individuals along a broad spectrum of achievement (Katzir et al., 2018; Piccolo et al., 2017). A recent meta-analysis of 34 studies of ESs indicated that general anxiety was experienced to a moderately greater degree by poor than typical readers, from children through adults (Francis, Caruana, Hudson, & McArthur, 2019). The more limited study of reading anxiety in L1 contexts has shown that reading anxiety is negatively associated with reading engagement in terms of on-task behavior during reading seatwork activities in fourth- and fifth-grade ESs (Stipek & Mason, 1987) and with indicators of reading rate and accuracy in ES first- and second-graders (Ramirez, Fries, et al., 2018) and native Hebrew-speaking second-graders (Katzir et al., 2018). Furthermore, Ramirez, Fries et al. found that reading anxiety correlated more strongly than positive reading affect with indicators of reading achievement.

Substantial work, however, has examined reading engagement in relation to reading achievement in L1 contexts, with evidence accrued using varied indicators of engagement, such as reading amount, print exposure, and teacher ratings based on observed behavior, that reading engagement indeed predicts reading achievement in K-12 students (e.g., Taboada et al., 2009, Guthrie, Wigfield, Metsala, & Cox, 1999; Mol & Bus, 2011) and does so, at least in part, by mediating the relations of socio-emotional variables with achievement (e.g., Guthrie et al., 2013;

Jang, 2008). To our knowledge, though, no studies have examined the interplay of reading anxiety, engagement, and achievement in ESs and DLLs within a single study.

The Current Study

In sum, together with others (e.g., Piccolo et al., 2017; Ramirez, Fries, et al., 2018) we contend that negative socioemotional dimensions of reading, particularly reading anxiety, are important but underexplored contributors to reading achievement – in both ESs and DLLs. Thus, we ask two main questions regarding the experience of reading anxiety by students from these language groups, and posit hypotheses based on the theories and empirical research outlined above. In our analyses we employ structural equation modeling with latent reading anxiety, reading engagement, and reading achievement variables, to account for measurement error.

Our research questions and hypotheses are:

1) How do DLLs and ESs in Grades 3-5 compare in their levels of reading anxiety, reading engagement, and reading achievement?

We hypothesize that DLLs will report greater reading anxiety, based, theoretically, on the consideration that DLLs are likely to value competence in academic reading but feel less in control of their success than their ES peers, and perhaps be especially sensitive to any negative feedback about their reading from their teachers or peers. Additionally, we hypothesize that DLLs will show somewhat lower reading achievement but equivalent reading engagement, consistent with past research involving elementary-grade DLLs and ESs (e.g., Taboada Baber, Cartwright et al., 2020; Taboada Barber, Klauda, & Stapleton, 2020), as outlined above. We expect discrepancies in reading achievement might not be as great as in past studies, given that we represent reading achievement with a latent factor based on decoding and comprehension

indicators, and young DLLs and ESs tend to perform similarly in decoding (Nakamoto, Lindsey, & Manis, 2007; Proctor, Carlo, August, & Snow, 2005).

2a) Does reading anxiety predict reading achievement to a similar extent for DLLs and ESs in Grades 3-5?

2b) Does reading engagement mediate the relations between reading anxiety and reading achievement for each language group?

We hypothesize that the disruption account (e.g., Ashcraft & Faust, 1994) will be supported, that is, that greater reading anxiety will predict lower reading achievement. Further, we hypothesize that reading engagement will at least partly mediate this relation; specifically, higher anxiety will predict lower engagement, and lower engagement will be associated with poorer achievement. These hypotheses are made in consideration of (a) the current study's focus on reading, a task in which performance may especially vulnerable to interference from reading anxiety, given its demands for intricate coordination of multiple cognitive skills (e.g., Derakshan & Eysenck, 2009; Follmer, 2018); (b) findings and theory that in general greater reading engagement predicts stronger achievement, and mediates relations between other socio-emotional variables (i.e., dimensions of reading motivation) and achievement (e.g., Guthrie et al., 2013; Guthrie & Klauda, 2016).

We expect these relations will appear for both language groups, and that they will either (a) be similar in strength for DLLs and ESs, or (b) stronger for DLLs than ESs. On the one hand, supporting (a), past research comparing the relations of socioemotional variables with reading achievement in DLLs and ESs has consistently found them to be equivalent (Proctor et al., 2014; Taboada Barber, Cartwright et al., 2020; Taboada Barber, Klauda, & Stapleton, 2020). On the other hand, past research has not specifically examined reading anxiety or any other negative

socioemotional constructs. Based on the premise that the effects of achievement anxiety may differ somewhat based on individual characteristics (Hembree, 1988), and that, in general, it has more powerful effects in contexts where individuals find tasks quite challenging (Tulis & Fulmer, 2013), it seems hypothesis (b) could alternatively be supported, especially if the DLLs fared less well in reading achievement in the present study than their ES classmates.

Method

Participants

The participants were 339 DLLs and 178 ESs in Grades 3-5 attending five elementary schools in one school district in a suburban area of a Mid-Atlantic state. They were designated DLLs or ESs based on district records regarding participation in English for Speakers of Other Languages (ESOL) instruction and Limited English Proficiency (LEP) status. Specifically, students were designated DLLs if they were eligible for ESOL instruction currently or had been at any time since school entry. Based on student report, 95.1% of the DLLs spoke Spanish, while the remainder spoke another non-English language. Students were designated ESs if school records indicated that they were never eligible for ESOL instruction. Table 1 summarizes the demographic characteristics of the sample.

Procedure

Data for this study was collected in spring 2019. All data collection activities cohered with American Psychological Association guidelines. Institutional Review Board approval, parental consent, and teacher consent were granted prior to data collection. Trained research assistants who completed two assessment-procedure fidelity checks administered the Woodcock Johnson-IV Tests of Achievement (WJ-IV) measures individually to students in quiet locations in the schools and gave the Gates-McGinitie Reading Comprehension test (GM-RC) and anxiety

scale in large group settings in classrooms or the school cafeteria. Teachers completed the measure of reading engagement.

Measures

Reading anxiety. The 6-item reading anxiety scale (RAS) was based on two existing measures of reading anxiety (Katzir et al., 2018; Ramirez , Fries, et al., 2018) and the Physiological State Subscale of the Sources of Self-Efficacy for Middle School Mathematics Scale (Usher & Pajares, 2009). Items were adapted with the intention of tapping feelings about school reading and reflecting reading activities that are commonly encountered by upper elementary students (e.g., *Just being in reading class makes me feel stressed; I get nervous when my teacher asks me to read something I never read before.)*. The response scale included four options: "NO!!", "no", "yes", and "YES!!". Instructions directed students to select their response for each item based on how different or similar it was to them. This type of response scale was used as it has been found to provide a clear response format for students from the primary through middle school grades (e.g., Hamilton, Nolen, & Abbott, 2013). The responses were coded from 1 to 4, and a mean score for anxiety was calculated. Regarding reliability, the measures on which the current scale was based had Cronbach's alpha values in the range of .83-.87 (Katzir et al., 2018; Ramirez, Fries, et al., 2018; Usher & Pajares, 2009). We present current internal consistency reliability for this and all study variables in the Results section, however, as we calculated McDonald's omega based on the formation of latent variable models. McDonald's omega is more appropriate for estimating the reliability of the total score than Cronbach's alpha when latent variables are formed as the residual variances and loadings for each latent variable indicator are unequal. As such, the tau equivalence assumption for the

Cronbach's alpha calculation is violated; for omega, there is no such assumption (McDonald, 2013).

Reading engagement. The Reading Engagement Index (REI; Guthrie, et al., 2007) renders teachers' ratings of their students' reading engagement based on their behavior, affect, and demonstration of cognitive and social involvement while reading. The REI includes eight items (e.g., *often reads independently, enjoys discussing books with peers*), answered on a scale ranging from *not true* (1) to *very true* (4); thus, total scores could vary from 8-32 points. The REI is scored by reverse coding one item (*is easily distracted in self-selected reading*), and then summing all item ratings. In past studies with elementary school-aged DLLs and ESs, Cronbach's alpha value for the REI has been strong, with a consistent value of 0.92 (Taboada Barber, Cartwright et al., 2020; Taboada Barber, Klauda, et al., 2020).

Reading achievement. Three measures were used to assess reading achievement and form a latent construct: one letter-word identification and two reading comprehension indicators. The Letter-Word Identification subtest of the Woodcock Johnson-IV Tests of Achievement, Form B (WJ-WI; Schrank, Mather, & McGrew, 2014) captured the decoding component of reading. The WJ-WI comprises 78 letters and English words that students are directed to read aloud; one point is earned for each item correctly identified. Total correct scores were transformed to *W* scores using the WJ-IV online scoring program. *W* scores are Rasch-scaled scores with equal intervals; a *W* score of 500 approximately represents the average reading performance of a 10 year old (Mather & Wendling, 2014). Split-half reliability for ages 7-10 range from .94-.96 (McGrew et al., 2014), and in past studies with elementary school-aged DLLs and ESs, Cronbach's alpha has ranged from .93-.98 (Taboada Barber, Cartwright et al., 2020; Taboada Barber, Klauda, et al., 2020).

The two reading comprehension measures were the passage comprehension subtest of the Woodcock Johnson-IV (WJ-RC), Form B (Schrank et al., 2014) and the reading comprehension subtest of the Gates-MacGinitie Reading Tests (GM-RC), Form T (MacGinitie, MacGinitie, Maria, & Dreyer, 2000). The WJ-RC which includes 52 items, which primarily require silently reading short passages of one or two sentences and providing a missing word. Total correct scores were converted to *W* scores (Schrank & Dailey, 2014). Split-half reliability for 7-10 year-olds ranges .89-.93 (McGrew, LaForte, & Schrank, 2014), and Cronbach's alpha has ranged from .84-.94 in past studies with elementary school-aged DLLs and ESs (Taboada Barber, Cartwright et al., 2020; Taboada Barber, Klauda, et al., 2020). The GM-RC contains narrative and expository passages, each 3 to 15 sentences long, followed by three to six multiple choice items. Total correct scores were converted to extended scale scores (ESSs) for analysis. Alternate form reliability ranges from .80-.87 and Cronbach's α from .91-.93 across levels (Maria & Hughes, 2008).

Data Analyses

Descriptive statistics and correlations for observed variables were calculated with SPSS 25. We then conducted structural equation modeling (SEM) using R's lavaan pacakage (Rosseel, 2012) for model fit and estimation. SEM was employed to (1) form latent variables for reading anxiety, engagement, and achievement and determine whether they demonstrated measurement invariance across language groups; (2) compare latent means of the language groups; (3) conduct multiple group SEM in order to assess whether the relations of reading anxiety, engagement, and achievement were invariant across language groups.

Results

Descriptive Statistics and Correlations

We report descriptive statistics and correlations based on observed variables for each language group (see Table 2). With respect to reading achievement, most students were performing on the low- to average end compared to available norms, especially the DLLs (Maria & Hughes, 2008; Mather & Wendling, 2014). Mean reading anxiety (RAS) and engagement (REI) were at to slightly above the scale midpoints of 2.5 and 24, respectively. The pattern of correlations was largely as expected, with the reading achievement and engagement variables correlating positively and moderately to strongly with each other, and weakly to moderately with anxiety in a negative direction. All correlations were significant at $p < .001$ except the correlation of RAS and REI for DLLs, which was significant at $p < .01$.

How Do DLLs and ESs Compare in Levels of Reading Anxiety, Engagement, and Achievement?

Overview. To address our first research question, concerning the comparative levels of reading anxiety, engagement, and achievement in DLLs and ESs, we formed latent variables through confirmatory factor analysis to represent each of these three constructs and then conducted a latent mean comparison for each construct. Detailed information on the CFAs conducted to form the latent variables is provided in the Supplementary Results.

The relative and absolute model fit indices used to select the CFA models were as follows:

1) Chi-square goodness-of-fit statistic: Smaller, non-statistically significant values indicate better fit. When comparing nested models, a significant change in the chi-square statistic indicates that the less constrained model fits better; a nonsignificant change in chi-square supports selection of the more constrained model (Hu & Bentler, 1999; Kline, 2016).

2) Root mean square error of approximation (RMSEA; Steiger, 2016; MacCallum, Browne, & Sugawara, 1996): Values of .10, .05, and .01 indicate mediocre, good, and excellent fit, respectively. The RMSEA's 90% confidence interval should have a lower bound ≤ .05 and an upper bound ≤ .10.

3) Standardized root mean square residual (SRMR; Hu & Bentler, 1999): Values ≤ .08 indicate good fit.

4) Comparative fit index (CFI; Bentler, 1990): Values ≥ .95 indicate good fit. The index may range from 0-1; 1 indicates perfect fit.

5) Tucker-Lewis index (TLI; Bentler & Bonett, 1980; Tucker & Lewis, 1973): Same criteria applies as for the CFI. This index, however, may exceed 1.

Reading anxiety. For reading anxiety, first a latent CFA model was fitted which included the six items comprising the RAS as indicators. The diagonally weighted least squares approach with the "Delta" parameterization was used since the data needed to be treated as categorical (Muthen & Asparouhov, 2002). The model showed good fit according to all indices evaluated (see Supplemental Results, Table S1 and Figure S1). McDonald's omega for the latent factor was .73, indicating good reliability.

Next, to assess measurement invariance across language groups, a necessary prerequisite for comparing latent means (i.e., this step ensures that any latent mean differences are not due to differences in latent variable structure), we used Wu and Estabrook's (2016) approach for ordinal response data and compared three nested models. Measurement invariance was indeed supported (see Supplemental Results, Table S2). A multiple group model with the invariance constraint was then fitted to compare the language groups' anxiety means, with the latent mean for ESs

constrained to be 0 and the DLLs' mean freely estimated. The groups did not differ significantly, $\mu_{dll} = 0.11,\ SE = 0.06, p = .058,$ effect size $(\delta) = 0.26.$

Reading engagement. For engagement, a latent CFA model was fitted, using the 8 items comprising the REI as indicators. As with reading anxiety, the response data was treated as categorical and so the diagonally weighted least squares approach with the "Delta" parameterization was employed. Fit was overall deemed good for the model (see Supplemental Results, Table S1 and Figure S2). McDonald's omega was .93, indicating strong reliability.

Again, using Wu and Estabrook's (2016) approach to compare three nested models, measurement invariance was found for reading engagement (see Supplemental Results, Table S2). A multiple group model with the invariance constraint was then fitted to compare latent means for DLLs, whose mean was freely estimated, and ESs, whose means was constrained to 0. The analysis indicated no difference between the groups, $\mu_{dll} = -0.03,\ SE = 0.09, p = .728, \delta = .037.$

Reading achievement. The latent reading achievement variable was formed using three continuous indicators: scores on the WJ-WI, WJ-RC, and GM-RC. To accommodate potential nonnormality and missingness, a unidimensional CFA model was estimated using the full information maximum likelihood estimator assuming missingness at random. The model was saturated and thus had perfect fit indices (see Supplemental Results, Figure S3 for the path model). McDonald's omega for latent reading achievement was .90, indicating strong reliability.

Measurement invariance for reading achievement across language groups was examined by fitting and comparing four nested models (Bentler, Lee, & Weng, 1987). Strict measurement invariance held for reading achievement across language groups (see Supplemental Results, Table S2). Analysis of a multiple group model with the invariance constraint was then fitted to

compare the language groups' means, again with the latent mean for ESs constrained to be 0 and the DLLs' mean freely estimated. The group mean difference was significant, μ_{dll} = -6.90, *SE* = 1.49, $p < .001$, $\delta = .46$, indicating that mean reading achievement was higher for the ESs than for the DLLs.

Does Reading Anxiety Predict Reading Achievement Similarly Across Language Groups?

To address research question 2a, which asked whether reading anxiety predicted reading achievement for both language groups, two multiple group SEM models were fitted that examined the direct effect of anxiety on achievement, controlling for grade level, and whether this effect was invariant for DLLs and ESs. In both models, the latent variables for reading anxiety and reading achievement were those established through the previous CFAs, which showed measurement invariance across language groups. Model 1 and Model 2 differed in that the former constrained all structural paths (i.e., those from reading anxiety and grade level to reading achievement, and from grade level to reading anxiety) to be equal across language groups, whereas Model 2 set the path from reading anxiety to reading achievement free. To compare the two nested structural models we used the Akaike Information Criteria (AIC; Aikake, 1987) and the Bayesian Information Criteria (BIC; Schwartz, 1978), in addition to evaluating model fit according to the chi-square goodness-of-fit statistic, RMSEA, SRMR, CFI, and TLI. Models with the lowest AIC and BIC values have the best fit.

Inspection of the fit indices, presented in Table 3, indicated that both Model 1 and Model 2 fit well. The chi-square difference test indicated that Model 1 did not fit more poorly than Model 2, $\Delta\chi^2 = 2.79, df = 1, p = .532$; therefore, Model 1, the more parsimonious model, was accepted, indicating that, anxiety's effect on achievement was the same across language groups.

Specifically, a one unit increase in anxiety was associated with a decrease in achievement of 11.61 units, $SE = 2.18$, $p < .001$ (see Figure 1).

Does Reading Engagement Mediate the Relations Between Reading Anxiety and Reading Achievement for Each Language Group?

To investigate reading engagement as a mediator of the effect of reading anxiety on reading achievement for DLLs and ESs, four multiple group models were examined: (1) a fully constrained model with all structural paths set equal; (2) a model with just the direct effect from anxiety to achievement free**;** (3) a model with just the indirect effect from anxiety to achievement via reading engagement free; (4) a model with *both* the direct and indirect effects free. Grade level was included as a control variable in each model. The same fit indices were considered as for the previous question.

As indicated by the fit indices in Table 3, all models fit the data well. Comparatively, Model 2 did not fit significantly better than Model 1, $\Delta\chi^2 = 3.39\,, df = 1, p = .065,$ while Model 3 significantly improved fit over Model 1, $\Delta\chi^2 = 7.85, df = 2, p = .019$. Additionally, Model 4 significantly improved fit over Model 3, $\Delta\chi^2 = 6.04\,, df = 1, p = .014$. Therefore, Model 4, was best supported, indicating that there were differences in both the direct and indirect effects across groups. As shown in Table 4, the direct, indirect, and total effects were statistically significant for each group, indicating that reading anxiety both directly affected reading achievement and had a mediated effect through reading engagement. However, the effects were greater for DLLs than ESs, with, notably, the direct effect of reading anxiety on achievement nearly three times as large for DLLs as for ESs, and the total effect nearly twice as large. Figure 2 shows the structural coefficients.

Discussion

Overview

The current study brings attention to the potential role of the emotion of reading anxiety in the reading achievement of elementary school-aged students of different language backgrounds. Previously, reading anxiety has undergone the most study with respect to its experience by students in and beyond the middle grades studying English as a foreign language in non-English speaking countries, rather than among native English speakers or students learning English in contexts where it is the societal language, as it is the case for DLLs in the United States (Piccolo et al., 2017). Furthermore, on the whole, negative socioemotional factors in students' reading have received limited attention in comparison to positive socioemotional factors, such as self-efficacy and interest in reading (Guthrie et al., 2013; Toste et al., 2020). In this study, we addressed these gaps by examining self-reported reading anxiety in conjunction with teacher-rated reading engagement and student reading achievement. Specifically, we asked (1) whether DLLs and ESs in Grades 3-5 showed similar levels of reading anxiety, engagement, and achievement, as well as (2) whether reading anxiety related similarly to reading achievement for the DLLs and ESs, including whether reading engagement mediated its relation with reading achievement. The results of this study suggest that reading anxiety merits increased scrutiny in research aimed at elucidating important contributors to reading achievement in DLLs and ESs in the elementary grades.

Levels of Reading Anxiety, Engagement, and Achievement in DLLs and ESs

With respect to our first research question, we hypothesized that DLLs would show higher reading anxiety, equal reading engagement, and lower reading achievement than ESs, controlling for grade level in all analyses. We formed latent variables for each of these

constructs, an approach that provides measurement error-free representations, but that has not often been taken in the study of socioemotional factors in children's reading. After establishing measurement invariance across language groups for each group – a critical step for ensuring that any apparent mean differences are not due to differences in latent variable structure – we examined latent mean differences. For reading anxiety, the mean difference was not statistically significant; however, DLLs did have a higher mean than ESs, which, with an associated *p* value of .058, suggests that there was a trend toward DLLs reporting greater anxiety. The effect size associated with the difference (.26), however, was small, suggesting that even if the difference was statistically significant, it may not have great practical significance. Considering how reading anxiety appears to be rooted in repeated negative experiences associated with reading, including perceived or actual critical reaction from others about one's reading (Jalongo & Hirsch, 2010; Ramirez, Fries, et al., 2018), this is a heartening finding, as it suggests that the DLLs may not be experiencing an environment which particularly provoked them, versus the ESs, to have anxious feelings about reading. Both groups reported moderate levels of reading anxiety, based on their mean total scores for the observed anxiety variable falling at or just above the midpoint (2.5) on the 4-point scale. Given the control-value theory of emotions (Pekrun, 2016; Pekrun & Linnenbrink-Garcia, 2012), which asserts that anxiety arises from greatly valuing success in a given area, but feeling out of control to achieve it, the comparable findings for anxiety across language groups raises the question of whether DLLs and ESs may report similar levels of reading anxiety because they attribute similar levels of value and control to the task of reading.

For reading engagement, we likewise did not find a significant difference across language groups, whereas for reading achievement we found a small to moderate difference ($\delta = .46$),

favoring ESs. These findings are consistent with our hypotheses, which were based on past research involving elementary-aged ESs and primarily Spanish-speaking DLLs, that similarly measured reading engagement with teacher ratings and that examined various facets of reading achievement (e.g., Taboada Barber, Cartwright et al., 2020; Taboada Barber, Klauda, et al., 2020). The finding that reading engagement levels were comparable across groups coheres with the speculation that reading anxiety levels may have been similar across these groups because they likely experienced similar environments about reading. For instance, an important facilitator of reading engagement at school is teacher efforts to help students find books that match their particular reading ability levels and interests (Guthrie & Klauda, 2016). If both DLLs and ESs experienced this and other engagement-supporting classroom practices equivalently, then it seems likely that they would display similar engagement in reading, while still showing varied reading achievement due to other factors and individual variation in receptiveness to particular classroom practices. Further, it is encouraging that the perceptions of teachers, who were aware of students' language backgrounds, and their reading challenges or struggles, were not negatively influenced in their ratings of students' engagement merely by students' DLL status.

Relations of Reading Anxiety, Engagement, and Achievement

Support for the disruption account of anxiety-achievement relations. With respect to the relations of reading anxiety with reading achievement, we hypothesized that they would show a negative relationship, in line with the disruption account (e.g., Ashcraft & Faust, 1994). This hypothesis was supported for both language groups. Zero-order relations between the observed variable mean for reading anxiety and each of the three reading achievement measures, all of which were significant, were negative and weak to moderate in magnitude (r = -.26 to -.40) for both ESs and DLLs. Our structural equation modeling of the relations between reading

engagement and achievement, controlling for grade level, likewise indicated a significant negative relationship. We further hypothesized that reading engagement would at least partially mediate the relations of reading anxiety and achievement. This was indeed the case – after including reading engagement in our model, reading anxiety showed both a significant indirect, negative effect on achievement through a negative effect on engagement as well as a significant direct, negative effect on achievement, for both language groups. Reading anxiety also maintained a direct effect.

These findings provide support for the disruption account of relations between academic anxiety and achievement, which has been minimally examined in the reading domain. For instance, one study of students in Grades 1 and 2 showed support for the disruption account in reading, particularly for boys (Ramirez et al., 2018a). However, the potential mechanisms for the negative relations between reading anxiety and achievement were not explored, although it was suggested that engagement might have been an important factor. The current study is the first we are aware of that has examined reading engagement as a potential mediator. But why is reading anxiety associated with reduced reading engagement, and thereby with lower reading achievement? According to control-value theory (Pekrun & Linnenbrink-Garcia, 2012), as a complex negative activating emotion anxiety reduces achievement in some circumstances, while in others, it enables it. In the domain of academic reading for elementary students, greater anxiety may be associated with lower reading achievement because of reading's complexity. In some learning contexts, worries about achievement prompted by anxiety may leave enough cognitive resources to fuel the application of rigid learning strategies, for instance, for students to drill themselves repeatedly to learn multiplication tables or U.S. state capitals. Anxiety may also prompt the motivation to do so, as students know that if they focus on memorizing a constrained

set of information, they will receive the extrinsic reward of a good grade, leading to students to expend their "nervous energy" on memorization. For reading, on the other hand, while some memorization is helpful – for instance, for learning sound-symbol correspondences – it does not guarantee success, especially in languages like English with many exceptions to and variations on its orthographical system. Moreover, success in reading depends on using the multiple components that undergird, the unconstrained skill of reading comprehension (Paris, 2005). Indeed, reading comprehension influences (and is influenced by) linguistic, cognitive, subject-area knowledge, and communicative proficiency in wide-ranging ways. Further, reading comprehension is an unconstrained skill, compared to alphabet knowledge, for example, because its range of influence on other learning and reading skills is not temporal and limited to early childhood, but lasts throughout life (Paris, 2005). As such, its scope and importance for school achievement is vast. Our construct of reading achievement was heavily influenced by two observed indicators of reading comprehension (WJ-RC and GM-RC), lending itself to be influenced by an achievement emotion such as anxiety. The third indicator was a measure of word recognition (WJ-WI), which may also be prone to influence by reading anxiety, as the words are tested in isolation, that is, without the potential to use context content to infer word recognition that do not follow the rules of sound-symbol correspondence. If substantial cognitive resources are consumed by reading anxiety, then insufficient ones may be available for reading itself, reducing the *cognitive* component of engagement and adversely affecting its influence on reading achievement, and comprehension in particular.

Further, students cannot memorize all the knowledge they need for successful reading comprehension in the same way that they can memorize a finite set of information like state capitals, or learn alphabet letters (a constrained reading skill). For students with reading anxiety,

reading, and reading comprehension in particular, may be a daunting task, in part because of its lack of definitiveness, and in part because like other unconstrained skills, it's difficult to achieve mastery, as it may continue to develop throughout the life span. As such, many students struggling with reading comprehension, may simply avoid it, in accord with the control-value theory perspective of anxiety often producing a "flight" response (Pekrun & Linnenbrink-Garcia, 2012), as would be reflected in a reduction in the *behavioral* component of reading engagement. Reading anxiety may also disrupt the *affective* component of engagement, as the perceived challenge of reading well, may, for instance diminish self-confidence and lead to decreased interest and enjoyment in reading. Dealing with the intrusive thoughts engendered by reading anxiety may also leave little energy to engage socially with others about reading, thus adversely impacting the *social* component of reading engagement. It is important, though, to consider that we represented reading engagement as a latent variable in this study; that is, that our reading engagement variable reflects the shared variance among the items used to capture engagement across its cognitive, behavioral, affective and social components. Thus, it must be emphasized that while reading engagement is construed as a multidimensional variable, those dimensions are intricately woven together: "[Reading] engagement is a network of bonds among skills, strategies, knowledge, and motivation, in the social community" (Guthrie et al., 2000, p. 209). Thus, it may be that reading anxiety produces an overall "flight" or escape response, which may be manifest in diminishment of overall reading engagement, as well as reduction in particular dimensions or components within the construct. Investigating the ways reading anxiety affects the various dimensions of reading engagement individually is a ripe area for future investigation. In particular, more direct measures of the cognitive processes that may be disrupted by reading anxiety should be considered. That is, the REI captured teachers' perceptions of students'

cognitive (and other aspects of) engagement in reading. Cognitive strategy use during reading activities and aspects of executive functioning that are central to reading (e.g., working memory), measured through student assessments, would likely mediate another portion of the effect of reading anxiety on achievement, in accord with research related to the disruption account in the math domain (Ramirez, Shaw, & Maloney, 2018).

Reading anxiety may be more harmful to DLLs' achievement. While the ESs and DLLs in the present study reported experiencing reading anxiety to a similar extent, and anxiety had significant direct and indirect effects on reading achievement for both groups, the study also accrued some evidence that reading anxiety may be more problematic for DLLs. In our first structural analysis (Figure 1), which examined only the relations between reading anxiety and reading achievement, controlling for grade level, we accepted the more parsimonious model in which relations were invariant across language groups. However, the alternative model, in which the effect was permitted to vary, fit equally well; it was only rejected on the principle of parsimony. Moreover, in our second structural analysis, in which reading engagement was included as a mediator of the relations between reading anxiety and reading achievement, the best-fitting model permitted the direct and indirect effects of reading anxiety on achievement to vary. This model indicated that reading anxiety had stronger direct and indirect effects on reading achievement for DLLs than for ESs, with the total effect for DLLs being about twice as great as that for ESs. However, most of the difference lay inhe direct effect being nearly three times as large for DLLs than for ESs.

The stronger effects of reading anxiety for DLLs might be simply explained by their lower reading achievement, given that anxiety, in general, tends to have stronger negative effects for challenging tasks (Tulis & Fulmer, 2013). Also, because of their less-developed English

linguistic knowledge and skills, DLLs may rely more on their executive functioning skills for reading, which may be especially susceptible to disruption by reading anxiety (Derakshan & Eysenck, 2009). Additionally, the stronger effects for DLLs, as well as the finding that a significant direct effect remained for both language groups after including reading engagement as a mediator, can be interpreted by considering stereotype threat. Stereotype threat occurs when a member of a group that has been stereotyped as having a negative characteristic performs poorly because fear or anxiety about fulfilling the stereotype inhibits their performance (Schmader, Johns, & Forbes, 2008; Steele & Aronson, 1995). For instance, Ramirez, Fries, et al. (2018) speculated that stereotype threat could explain why they found evidence that boys – who are often stereotyped as being less verbally competent than girls – appeared more vulnerable to the effects of reading anxiety. In the current study, both language groups, DLLs and ESs, came largely from low SES backgrounds; it is likely that by the mid- to upper-elementary grades children are aware of their family's general income level (i.e., whether they are rich, poor, or somewhere in between), and of the stereotype that children from less wealthy families tend not to achieve as highly as their more well-to-do peers. Reading achievement may be particularly fitting for this stereotype. Moreover, DLLs may perceive that they are expected to struggle with reading, due to their still-developing English proficiency. Thus, the DLLs in our study, 91% of whom were receiving free or reduced meals, the only indicator of SES available to us, may have been especially susceptible to stereotype threat. While reading anxiety precipitating from stereotype threat could plausibly be linked to reading achievement in part by disrupting reading engagement (as evinced by the indirect effects of anxiety on achievement through reading engagement), the impact of stereotype threat may especially be tied to self-beliefs, and how socio-economic factors may strengthen or diminish the effects of stereotype threat on them

(Steele, Spencer, & Aronson, 2002), thus potentially providing an explanation for the direct effects of anxiety on achievement for both groups in this sample. While, specifically, self-confidence as a reader was reflected in only one item in our reading engagement measure, it may be necessary to capture it more fully through other constructs related to self-perception to support the plausible explanation of stereotype threat accounting for the direct effect of reading anxiety on reading achievement.

Limitations and Future Research Directions

At the broadest level, the present findings suggest that reading anxiety warrants further investigation as a potentially important socio-emotional correlate of reading achievement – and a plausible target for intervention efforts aimed at strengthening reading achievement in both DLLs and ESs. The present study used reading anxiety and reading achievement data from a single timepoint, however, limiting insight into their potentially causal and/or reciprocal relations. As suggested by research with younger (Grade 1 and 2) ESs, early struggles with reading may particularly be associated with developing reading anxiety in later grades, and reading anxiety and reading achievement may perpetuate one another through a recursive negative feedback loop (Ramirez, Fries, et al. (2018). Examining these dynamics in DLLs, particularly those entering kindergarten with limited English proficiency whose struggles with reading comprehension seem to be accentuated and diverge from those of ES yielding large differences by Grade 5 (Kieffer, 2008) may be particularly important for providing insight into when and how during the early elementary years to intervene to break this cycle. The effects of persistent reading anxiety developed through repeated negative experiences with text, might also be compared to the effects of reading anxiety as a temporary state associated with particular contexts, which may, conversely, facilitate achievement (Tulis & Fulmer, 2013). Additionally, it

may be worth considering the role of reading anxiety with respect to different activities or different text types – for example, reading aloud in class versus silently to answer comprehension questions, reading a science text versus a poem. These contrasts across different populations of students may yield helpful insight into how to structure reading assignments to minimize potential deleterious effects of reading anxiety.

Further research is also needed that focuses on the mechanisms of relations between reading anxiety and reading achievement. While the present study demonstrated that teacher-rated reading engagement partially mediated their relations, more fine-grained assessments of reading engagement, and employment of other reporters of engagement (students themselves, observers) are warranted. Direct measures of the cognitive processes that may be disrupted while reading would also be beneficial. Reading avoidance, that is, ways in which students actively seek to avoid engaging in reading activities, should be examined in relation to reading anxiety, as high avoidance and low engagement are not synonymous (Guthrie et al., 2013); further, doing so follows from the control-value theory conception of anxiety as a negative activating emotion which tends to prompt flight (versus fight) responses (Pekrun & Linnenbrink-Garcia, 2012). Additionally, models that examine reading anxiety, engagement, and achievement in conjunction with other socio-emotional variables (e.g., such as valuing and intrinsic motivation for reading) are needed. Indeed, individuals experience anxiety alongside other emotions and beliefs about reading that are likely to interact with or be moderated by student characteristics; for instance, reading anxiety may affect reading achievement differently for students who have strong versus weak intrinsic reading motivation. The extent to which reading anxiety may be related to stereotype threat, and whether reading anxiety that is due to stereotype threat impacts reading achievement through other mechanisms should be also examined in DLLs and/or other

demographic groups. Alternative methods of assessing reading anxiety, such as physiological assessments of stress, may also be important as research indicates that on questionnaires individuals tend to underreport their anxiety due to stereotype threat (Schmader et al., 2008).

Comparing the levels and effects of reading anxiety in DLLs learning English and DLLs learning a language with a more transparent orthography is another viable research direction. Languages with more consistent sound-symbol correspondences than English may not seem as daunting to learn to read, thus provoking less reading anxiety. Plus, in such contexts, if anxiety promotes use of rigid strategies like rote memorization, as previous research suggests, then anxiety may be more positively linked to reading achievement (Pekrun & Linnenbrink-Garcia, 2012).

Practical Implications and Conclusions

Our findings indicated that reading anxiety relates negatively to the reading achievement of elementary students, with its effects on achievement partially mediated through reading engagement. Further, relations between reading anxiety and achievement may be stronger for DLLs than for ESs – of similar SES, as was the case in this sample – although their reading anxiety and reading engagement levels may be similar. Based on the current findings and other recent studies (e.g., Katzir et al., 2018; Ramirez, Fries, et al., 2018), we believe that reading anxiety is an important construct to continue examining, especially because of its potential malleability, and its role within theories and practice of Socio-Emotional learning (SEL). For example, the interpretation account of academic anxiety suggests that if teachers and parents model adaptive responses to reading difficulties, children may be less likely to develop reading anxiety, and, likewise, interventions for students that teach them to attribute reading difficulties to malleable factors (e.g., effort, task difficulty) may help reduce reading anxiety and thereby

improve achievement (Dweck, 2006; Ramirez, Fries, et al., 2018, Ramirez, Shaw, & Maloney, 2018). Others suggest that reading anxiety may be averted or remediated if educators focus on structuring reading activities for success while increasing challenge incrementally, developing activities that foster a sense of pleasure about reading, and matching reading with students' topic interests and curiosities (Jalongo & Hirsch, 2010). These recommendations align well with current understanding of classroom practices that promote engaged reading that have been shown to foster reading engagement in DLLs and ESs alike (e.g., Guthrie & Klauda, 2016; Taboada Barber et al., 2018). Lastly, SEL has been receiving increased attention in elementary schools in the past few years, with emphasis mostly on teaching students to acquire and effectively apply the knowledge and attitudes necessary to understand their emotions, feel and show empathy for others and establish positive relationships and goals (Schonert-Reichl, Kitil, & Hanson-Peterson, 2017). We would like to emphasize that effective goal setting and positive relationships also require awareness of one's negative, or less desirable emotions, that can hinder or – in the right amounts – benefit learning and reading, such as anxiety. Hopefully, the present findings spark increased interest in studying reading anxiety as a socio-emotional factor in reading achievement, and in calling attention to critical non-academic skills that can contribute to children's well-being.

References

Aaron, P. G., Joshi, R. M., Gooden, R., & Bentum, K. E. (2008). Diagnosis and treatment of reading disabilities based on the component model of reading: An alternative to the discrepancy model of LD. *Journal of Learning Disabilities*, *41*(1), 67-84. doi:10.1177/0022219407310838

Ashcraft, M. H., & Faust, M. W. (1994). Mathematics anxiety and mental arithmetic performance: An exploratory investigation. *Cognition and Emotion*, *8*(2), 97-125. doi:10.1080/02699939408408931

Akaike, H. (1987). Factor analysis and AIC. *Psychometrika*, *52*(3), 317-332. doi:10.1007/bf02294359

Bentler, P. M. (1990). Comparative fit indexes in structural models. *Psychological Bulletin*, *107*(2), 238-246. doi:10.1037/0033-2909.107.2.238

Bentler, P. M., & Bonett, D. G. (1980). Significance tests and goodness of fit in the analysis of covariance structures. *Psychological Bulletin*, *88*(3), 588-606. doi:10.1037/0033-2909.88.3.588

Bentler, P. M., Lee, S.-Y., & Weng, L.-J. (1987). Multiple population covariance structure analysis under arbitrary distribution theory. *Communication in Statistics – Theory and Method, 16*(7), 1951–1964. doi: 10.1080/03610928708829482

Brantmeier, C. (2005). Anxiety about L2 reading or L2 reading tasks? A study with advanced language learners. *Reading*, *5*(2), 67-85.

Butterfuss, R., & Kendeou, P. (2018). The role of executive functions in reading comprehension. *Educational Psychology Review*, *30*, 801-826. doi:10.1007/s10648-017-9422-6

Chapman, J. W., & Tunmer, W. E. (1995). Development of young children's reading self-concepts: An examination of emerging subcomponents and their relationship with reading achievement. *Journal of Educational Psychology*, *87*(1), 154-167. doi:10.1037//0022-0663.87.1.154

Cheng, Y. (2017). Development and preliminary validation of four brief measures of L2 language-skill-specific anxiety. *System*, *68*, 15-25. doi:10.1016/j.system.2017.06.009

Derakshan, N., & Eysenck, M. W. (2009). Anxiety, processing efficiency, and cognitive performance. *European Psychologist*, *14*(2), 168-176. doi:10.1027/1016-9040.14.2.168

Dweck, C. S. (2006). Mindset: The new psychology of success. New York, NY: Random House.

Elleman, A. M., & Oslund, E. L. (2019). Reading comprehension research: Implications for practice and policy. *Policy Insights From the Behavioral and Brain Sciences*, *6*(1), 3-11. doi:10.1177/2372732218816339

Follmer, D. J. (2018). Executive function and reading comprehension: A meta-analytic review. *Educational Psychologist*, *53*(1), 42-60. doi:10.1080/00461520.2017.1309295

Francis, D. A., Caruana, N., Hudson, J. L., & McArthur, G. M. (2019). The association between poor reading and internalising problems: a systematic review and meta-analysis. *Clinical Psychology Review*, *67*, 45-60. doi:10.1016/j.cpr.2018.09.002

Fredricks, J. A., Blumenfeld, P. C., & Paris, A. H. (2004). School engagement: Potential of the concept, state of the evidence. *Review of Educational Research*, *74*(1), 59-109. doi:10.3102/00346543074001059

Guimba, W. D., & Alico, J. C. (2015). Reading anxiety and comprehension of grade 8 Filipino learners. *International Journal of Humanities and Social Sciences, Special Volume*, 44-59.

Guthrie, J. T., Cox, K. E., Knowles, K. T., Buehl, M., Mazzoni, S. A., & Fasulo, L. (2000). Building toward coherent instruction. In L. Baker, M. J. Dreher, & J. T. Guthrie (Eds.), *Engaging young readers: Promoting achievement and motivation* (pp. 209-237). New York, NY: Guilford Press.

Guthrie, J. T., Hoa, A. L. W., Wigfield, A., Tonks, S. M., Humenick, N. M., & Littles, E. (2007). Reading motivation and reading comprehension growth in the later elementary years. *Contemporary Educational Psychology, 32,* 282–313. https ://doi.org/10.1016/j.cedps ych.2006.05.004.

Guthrie, J. T., & Klauda, S. L. (2016). Engagement and motivational processes in reading. In P. Afflerbach (Ed.), *Handbook of individual differences in reading: Reader, text, and context* (pp. 41-53). New York, NY: Routledge.

Guthrie, J. T., Klauda, S. L., & Ho, A. (2013). Modeling the relationships among reading instruction, motivation, engagement, and achievement for adolescents. *Reading Research Quarterly*, *48*(1), 9-26. doi:10.1002/rrq.035

Guthrie, J. T., & Wigfield, A. (2000). Engagement and motivation in reading. In M. L. Kamil, P. B. Mosenthal, P. D. Pearson, & R. Barr (Eds.), *Reading research handbook* (Vol. 3, pp. 403-424). New Jersey: Lawrence Erlbaum.

Guthrie, J. T., Wigfield, A., Metsala, J. L., & Cox, K. E. (1999). Motivational and cognitive predictors of text comprehension and reading amount. *Scientific Studies of Reading*, *3*(3), 231-257. doi: 10.1207/s1532799xssr0303_3

Hamilton, E. W., Nolen, S. B., & Abbott, R. D. (2013). Developing measures of motivational orientation to read and write: A longitudinal study. *Learning and Individual Differences, 28,* 151-166. doi:10.1016/j.lindif.2013.04.007

Hembree, R. (1988). Correlates, causes, effects, and treatment of test anxiety. *Review of Educational Research*, *58*(1), 47-77. doi:10.3102/00346543058001047

Hu, L. T., & Bentler, P. M. (1999). Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Structural Equation Modeling: A Multidisciplinary Journal*. *6*(1), 1-55. doi:10.1080/10705519909540118

Jalongo, M. R., & Hirsh, R. A. (2010). Understanding reading anxiety: New insights from neuroscience. *Early Childhood Education Journal*, *37*(6), 431-435. doi:10.1007/s10643-010-0381-5

Jang, H. (2008). Supporting students' motivation, engagement, and learning during an uninteresting activity. *Journal of Educational Psychology, 100*, 798–811.

Katzir, T., Kim, Y. S. G., & Dotan, S. (2018). Reading self-concept and reading anxiety in second grade children: the roles of word reading, emergent literacy skills, working memory and gender. *Frontiers in Psychology*, *9*, 1180. doi:10.3389/fpsyg.2018.01180

Kieffer, M. J. (2008). Catching up or falling behind? Initial English proficiency, concentrated poverty, and the reading growth of language minority learners in the United States. *Journal of Educational Psychology, 100*(4), 851-868. https://doi.org/10.1037/0022-0663.100.4.851

Kline, R. B. (2016). *Principles and practice of structural equation modeling* (4th ed.). New York, NY: Guilford Press.

MacCallum, R. C., Browne, M. W., & Sugawara, H. M. (1996). Power analysis and determination of sample size for covariance structure modeling. *Psychological Methods*, *1*(2), 130-149. doi:10.1037/1082-989x.1.2.130

MacGinitie, W. H., MacGinitie, R. K., Maria, K., & Dreyer, L. G. (2000). *Gates-MacGinitie reading tests* (4th ed.). Itasca, IL: Riverside.

Mancilla-Martinez, J., & Lesaux, N. K. (2010). Predictors of reading comprehension for struggling readers: The case of Spanish-speaking language minority learners. *Journal of Educational Psychology*, *102*(3), 701-711. doi:10.1037/a0019135

Maria, K., & Hughes, K. E. (2008). *Gates-MacGinitie Reading Tests: Technical report supplement.* Riverside Insights. Retrieved from https://www.riversideinsights.com/p/gates-macginitie-reading-tests-gmrt-technical-report-supplement-only/

Mather, N., & Wendling, B. J. (2014). *Examiner's manual. Woodcock-Johnson IV Tests of Achievement.* Rolling Meadows, IL: Riverside.

McDonald, R. P. (2013). *Test theory: A unified treatment*. Psychology Press. doi:10.4324/9781410601087

McGrew, K. S., LaForte, E. M., & Schrank, F. A. (2014). *Woodcock Johnson IV Technical Manual.* Rolling Meadows, IL: Riverside.

Mills, N., Pajares, F., & Herron, C. (2006). A reevaluation of the role of anxiety: Self-efficacy, anxiety, and their relation to reading and listening proficiency. *Foreign Language Annals*, *39*(2), 276-295. doi:10.1111/j.1944-9720.2006.tb02266.x

Mohammadpur, B., & Ghafournia, N. (2015). An elaboration on the effect of reading anxiety on reading achievement. *English Language Teaching*, *8*(7), 206-215. doi:10.5539/elt.v8n7p206

Mol, S. E., & Bus, A. G. (2011). To read or not to read: a meta-analysis of print exposure from infancy to early adulthood. *Psychological Bulletin*, *137*(2), 267-296. doi:10.1037/a0021890

Muthén, B., & Asparouhov, T. (2002). Latent variable analysis with categorical outcomes: Multiple-group and growth modeling in Mplus. *Mplus web notes*, *4*(5), 1-22.

Nakamoto, J., Lindsey, K. A., & Manis, F. R. (2007). A longitudinal analysis of English language learners' word decoding and reading comprehension. *Reading and Writing*, *20*(7), 691-719. doi:10.1007/s11145-006-9045-7

National Assessment of Educational Progress. (2019). *NAEP report card: Reading*. Retrieved from https://www.nationsreportcard.gov/reading/nation/achievement/?grade=4

National Center for Education Statistics (NCES) (2020). *The condition of education: English language learners in public schools*. Retrieved from https://nces.ed.gov/programs/coe/indicator_cgf.asp

Orellana García, P. (2018). To what extent is reading motivation a significant predictor of reading achievement when controlling for language and cognitive achievement? A systematic review. In P. Orellana García, & P. Baldwin Lind (Eds.), *Reading achievement motivation in boys and girls: Field studies and methodological approaches* (pp. 79-96). Cham, Switzerland: Springer.

Paris, S. G. (2005). Reinterpreting the development of reading skills. Reading Research Quarterly, 40(2), 184–202. doi:10.1598/RRQ.40.2.3

Park, D., Ramirez, G., & Beilock, S. L. (2014). The role of expressive writing in math anxiety. *Journal of Experimental Psychology: Applied*, *20*(2), 103-111. doi:10.1037/xap0000013

Pekrun, R. (2016). Academic emotions. In K. R. Wentzel, & D. B. Miele (Eds.), *Handbook of Motivation at School* (2nd ed., pp. 120-144). New York: Routledge Handbooks Online.

Pekrun, R., Goetz, T., Titz, W., & Perry, R. P. (2002). Academic emotions in students' self-regulated learning and achievement: A program of qualitative and quantitative research. *Educational Psychologist*, *37*(2), 91-105. doi:10.1207/S15326985EP3702_4

Pekrun, R., Lichtenfeld, S., Marsh, H. W., Murayama, K., & Goetz, T. (2017). Achievement emotions and academic performance: Longitudinal models of reciprocal effects. *Child Development*, *88*(5), 1653-1670. doi:10.1111/cdev.12704

Pekrun, R., & Linnenbrink-Garcia, L. (2012). Academic emotions and student engagement. In S.L. Christenson, A.L. Reschly, & C. Wylie (Eds.), *Handbook of research on student engagement* (pp. 259-282). Boston, MA: Springer. doi:10.1007/978-1-4614-2018-7_12

Piccolo, L. R., Giacomoni, C. H., Julio-Costa, A., Oliveira, S., Zbornik, J., Haase, V. G., & Salles, J. F. (2017). Reading anxiety in L1: Reviewing the concept. *Early Childhood Education Journal*, *45*(4), 537-543. doi:10.1007/s10643-016-0822-x

Proctor, C. P., Carlo, M., August, D., & Snow, C. (2005). Native Spanish-speaking children reading in English: Toward a model of comprehension. *Journal of Educational Psychology*, *97*(2), 246-256. doi:10.1037/0022-0663.97.2.246

Proctor, C. P., Daley, S., Louick, R., Leider, C. M., & Gardner, G. (2014). How motivation and engagement predict reading comprehension among native English-speaking and English learning middle school students with disabilities in a remedial reading curriculum. *Learning and Individual Differences*, *36*, 76-83. doi:10.1016/j.lindi f.2014.10.014

Rajab, A., Zakaria, W. Z. W., Rahman, H. A., Hosni, A. D., & Hassani, S. (2012). Reading anxiety among second language learners. *Procedia - Social and Behavioral Sciences*, *66*, 362-369. doi:10.1016/j.sbspro.2012.11.279

Ramirez, G., Fries, L., Gunderson, E., Schaeffer, M. W., Maloney, E. A., Beilock, S. L., & Levine, S. C. (2018). Reading anxiety: An early affective impediment to children's success in reading. *Journal of Cognition and Development*, *20*(1), 15-34. doi:10.1080/15248372.2018.1526175

Ramirez, G., Shaw, S. T., & Maloney, E. A. (2018). Math anxiety: Past research, promising interventions, and a new interpretation framework. *Educational Psychologist*, *53*(3), 145-164. doi:10.1080/00461520.2018.1447384

Rosseel, Y. (2012). lavaan: An R Package for Structural Equation Modeling. *Journal of Statistical Software*, *48*(2), 1-36. Retrieved from http://www.jstatsoft.org/v48/i02/.

Saito, Y., Garza, T. J., & Horwitz, E. K. (1999). Foreign language reading anxiety. *The Modern Language Journal*, *83*(2), 202-218. doi:10.1111/0026-7902.00016

Schiefele, U., Schaffner, E., Möller, J., & Wigfield, A. (2012). Dimensions of reading motivation and their relation to reading behavior and competence. *Reading Research Quarterly*, *47*(4), 427-463. doi:10.1002/RRQ.030

Schmader, T., Johns, M., & Forbes, C. (2008). An integrated process model of stereotype threat effects on performance. *Psychological Review*, *115*(2), 336-356. doi:10.1037/0033-295x.115.2.336

Schonert-Reichl, K. A., Kitil, M. J., & Hanson-Peterson, J. (2017). *To reach the students, teach the teachers: A national scan of teacher preparation and social and emotional learning. A report prepared by CASEL.* Retrieved from https://eric.ed.gov/?id=ED582029

Schrank, F. A., & Dailey, D. (2014). *Woodcock-Johnson online scoring and reporting program*. Rolling Meadows, IL: Riverside.

Schrank, F. A., Mather, N., & McGrew, K. S. (2014). *Woodcock-Johnson IV tests of oral language*. Rolling Meadows, IL: Riverside.

Schwartz, G. (1978). Estimating the dimension of a model. *The Annals of Statistics*, *6*(2), 461-464. doi:10.1214/aos/1176344136

Shao, K., Pekrun, R., & Nicholson, L. J. (2019). Emotions in classroom language learning: What can we learn from achievement emotion research? *System*, *86*, 102121. doi:10.1016/j.system.2019.102121

Steiger, J. H. (2016). Notes on the Steiger–Lind (1980) handout. *Structural Equation Modeling, 23*(6), 777–781. https://doi.org/10.1080/10705511.2016.1217487

Stipek, D. J., & Mason, T. C. (1987). Attributions, emotions, and behavior in the elementary school classroom. *The Journal of Classroom Interaction*, *22*(2), 1-5.

Steele, C. M., & Aronson, J. (1995). Stereotype threat and the intellectual test performance of African Americans. *Journal of Personality and Social Psychology, 69*(5), 797–811. https://doi.org/10.1037/0022-3514.69.5.797

Steele, C. M., Spencer, S. J., & Aronson, J. (2002). Contending with group image: The psychology of stereotype and social identity threat. In M. P. Zanna (Ed.), *Advances in experimental social psychology* (pp. 379–440). Cambridge, MA: Academic Press.

Taboada, A., Tonks, S. M., Wigfield, A., & Guthrie, J. T. (2009). Effects of motivational and cognitive variables on reading comprehension. *Reading and Writing*, *22*(1), 85-106. doi:10.1007/s11145-008-9133-y

Taboada, A., Townsend, D., & Boynton, M. J. (2013). Mediating effects of reading engagement on the reading comprehension of early adolescent English language learners. *Reading & Writing Quarterly*, *29*(4), 309-332. doi:10.1080/10573569.2013.741959

Taboada Barber, A., Buehl, M.M., Beck. J. S. (2017). Dynamics of engagement and disaffection in a social studies classroom context. *Psychology in the Schools*, *54* (7), 736-755. **doi:**10.1002/pits.22027

Taboada Barber, A., Buehl, M. M., Beck, J. S., Ramirez, E. M., Gallagher, M., & Archer, C. J. (2018). Literacy in social studies: The influence of cognitive and motivational practices on the reading comprehension of English Learners and Non-English Learners. *Reading & Writing Quarterly*, *34*, 79–97. https ://doi.org/10.1080/10573 569.2017.13449 42.

Taboada Barber, A., Cartwright, K. B., Stapleton, L. M., Klauda, S. L., Archer, C. J., & Smith, P. (2020). Direct and indirect effects of executive functions, reading engagement, and higher order strategic processes in the reading comprehension of Dual Language Learners and English Monolinguals. *Contemporary Educational Psychology*, *61*, 101848. doi:10.1016/j.cedpsych.2020.101848

Taboada Barber, A., & Klauda, S. L. (2020). How reading motivation and engagement enable reading achievement: Policy implications. *Policy Insights from the Behavioral and Brain Sciences*, *7*(1), 27-34. doi:10.1177/2372732219893385

Taboada Barber, A., Klauda, S. L., & Stapleton, L. M. (2020). Cognition, engagement, and motivation as factors in the reading comprehension of Dual Language Learners and English Speakers: Unified or distinctive models? *Reading and Writing*, 1-31. doi:10.1007/s11145-020-10034-4

Toste, J. R., Didion, L., Peng, P., Filderman, M. J., & McClelland, A. M. (2020). A meta-analytic review of the relations between motivation and reading achievement for K–12 students. *Review of Educational Research*, *90*(3), 420-456. doi:10.3102/0034654320919352

Tucker, L. R., & Lewis, C. (1973). A reliability coefficient for maximum likelihood factor analysis. *Psychometrika*, *38*(1), 1-10. doi:10.1007/bf02291170

Tulis, M., & Fulmer, S. M. (2013). Students' motivational and emotional experiences and their relationship to persistence during academic challenge in mathematics and reading. *Learning and Individual Differences*, *27*, 35-46. doi:10.1016/j.lindif.2013.06.003

Unrau, N., & Schlackman, J. (2006). Motivation and its relationship with reading achievement in an urban middle school. *The Journal of Educational Research*, *100*(2), 81-101. doi:10.3200/JOER.100.2.81-101

Usher, E. L., & Pajares, F. (2009). Sources of self-efficacy in mathematics: A validation study. *Contemporary Educational Psychology*, *34*(1), 89-101. doi:10.1016/j.cedpsych.2008.09.002

Wallbrown, F., Brown, B., & Engin, A. (1978). A factor analysis of reading attitudes along with measures of reading achievement and scholastic aptitude. *Psychology in the Schools*, *15*(2), 160-165. doi: 10.1002/1520-6807(197804)15:2<160::AID-PITS2310150204>3.0.CO;2-G

Wu, H., & Estabrook, R. (2016). Identification of confirmatory factor analysis models of different levels of invariance for ordered categorical outcomes. *Psychometrika*, *81*(4), 1014-1045. doi:10.1007/s11336-016-9506-0

Zbornik, J. (1988). *Empirical and theoretical extension of a reading anxiety paradigm*. Kent, OH: Kent State University.

Zbornik, J., & Wallbrown, F. H. (1991). The development and validation of a scale to measure reading anxiety. *Reading Improvement*, *28*(1), 2-13.

Table 1

Sample Demographics

	Full sample (%) (*n* = 517)	Dual Language Learners (%) (*n* = 339)	English Speakers (%) (*n* = 178)
Grade			
Third	31.4%	33.1%	27.9%
Fourth	32.2%	33.1%	30.3%
Fifth	36.4%	33.7%	41.8%
FARMS status			
FARMS	84.5%	91.3%	70.7%
No FARMS	15.5%	8.7%	29.3%
Gender			
Female	49.2%	46.1%	55.5%
Male	50.8%	53.9%	44.5%
Ethnicity/race			
Hispanic	64.7%	95.2%	3.0%
Black	26.8%	0.9%	79.3%
White	3.6%	0.9%	9.1%
Multi-racial	2.0%	0.0%	6.1%
Asian	2.8%	3.0%	2.4%

Note. Percentages may not sum to 100 due to rounding.

Table 2

Correlation Matrix and Descriptive Statistics for Study Measures

	RAS	REI	WJ-WI	WJ-RC	GM-RC
RAS	—	-.30***	-.31***	-.26***	-.40***
REI	-.15**	—	.45***	.41***	.43***
WJ-WI	-.28***	.53***	—	.86***	.69***
WJ-RC	-.28***	.49***	.85***	—	.67***
GM-RC	-.30***	.43***	.70***	.68***	—
DLLs					
M	2.67	26.74	476.39	475.82	461.46
SD	0.62	7.53	25.49	16.29	34.97
ESs					
M	2.49	26.81	481.52	482.96	477.79
SD	0.81	8.10	26.99	16.93	40.61

Note. Values for DLLs appear below the diagonal; values for ESs appear above the diagonal. Pairwise deletion was employed. The n for DLLs ranges from 312-331; for ESs, from 159-173. Read. Anx. = Reading Anxiety Scale. REI = Reading Engagement Index. WJ-WI = Woodcock-Johnson IV word identification. WJ-RC = Woodcock-Johnson IV reading comprehension. GM-RC = Gates-MacGinitie reading comprehension.
**$p < .01$. ***$p < .001$.

Table 3

Structural Model Fit Indices for Predicting Reading Achievement from Reading Anxiety and Engagement

	χ^2	*df*	*p* value	RMSEA	SRMR
Direct effect only					
Model 1: Anx → Ach constrained	**117.671**	**86**	**.013**	**.042 [.02,.06]**	**.062**
Model 2: Anx → Ach free	114.881	85	.017	0.041 [.018,.059]	.061
Direct and indirect effects					
Model 1: Anx → Ach, Anx → Eng → Ach constrained	487.605	303	0	.055 [.046,.064]	.067
Model 2: Anx → Ach free; Anx → Eng → Ach constrained	484.212	302	0	.055 [.046,.064]	.066
Model 3: Anx → Ach constrained; Anx → Eng → Ach free	495.452	301	0	.057 [.048,.066]	.067
Model 4: Anx → Ach, Anx → Eng → Ach free	**489.414**	**300**	**0**	**.056 [.047,.065]**	**.066**

Note. Selected models are bold-faced. RMSEA = root mean square error of approximation. L= lower bound of 90% confidence interval.
U = upper bound of 90% confidence interval. SRMR = standardized root mean square residual.
CFI = comparative fit index.
TLI = Tucker-Lewis index.

Table 4

Unstandardized Direct, Indirect, and Total Effects of Reading Anxiety on Reading Achievement

Group	Direct			Indirect through RE			Total		
	Effect	*SE*	*p* value	Effect	*SE*	*p* value	Effect	*SE*	*p* value
DLL	-13.42	4.87	.006	-7.99	3.49	.02	-21.41	7.31	.003
ES	-4.76	1.75	.007	-5.51	1.43	<.001	-10.27	2.25	<.001

Note. RE = reading engagement.

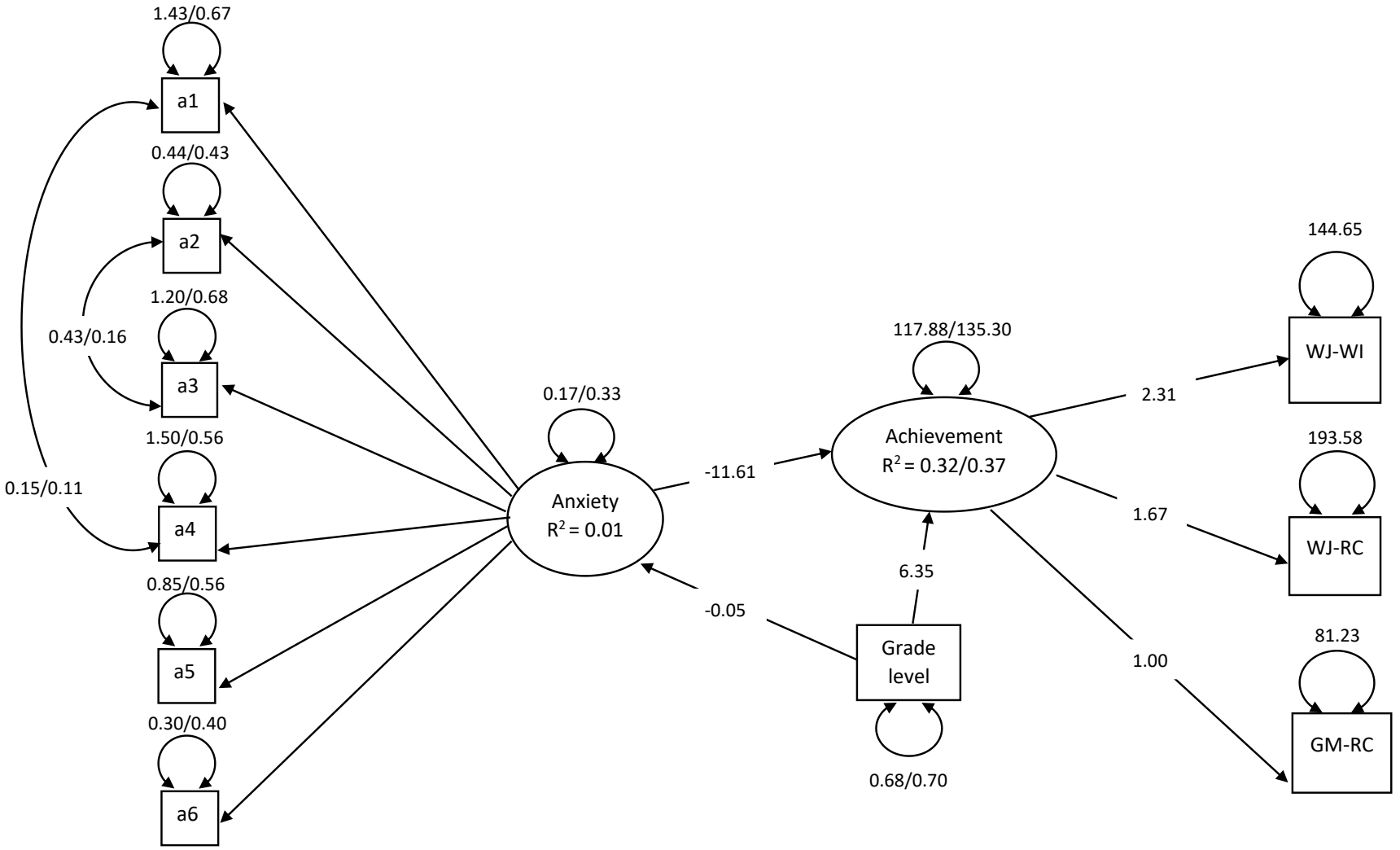
1.43/0.67
a1
0.44/0.43
a2
1.20/0.68
a3
1.50/0.56
a4
0.85/0.56
a5
0.30/0.40
a6
0.43/0.16
0.15/0.11
0.17/0.33
Anxiety
R2 = 0.01
-11.61
-0.05
117.88/135.30
Achievement
R2 = 0.32/0.37
6.35
Grade level
0.68/0.70
2.31
1.67
1.00
144.65
WJ-WI
193.58
WJ-RC
81.23
GM-RC

Figure 1. Path diagram depicting multiple group SEM with reading anxiety predicting reading achievement (DLLs/ELs). Values that are equivalent across groups are printed once. WJ-WI = Woodcock-Johnson IV word identification. WJ-RC = Woodcock-Johnson IV reading comprehension. GM-RC = Gates-MacGintitie reading comprehension.

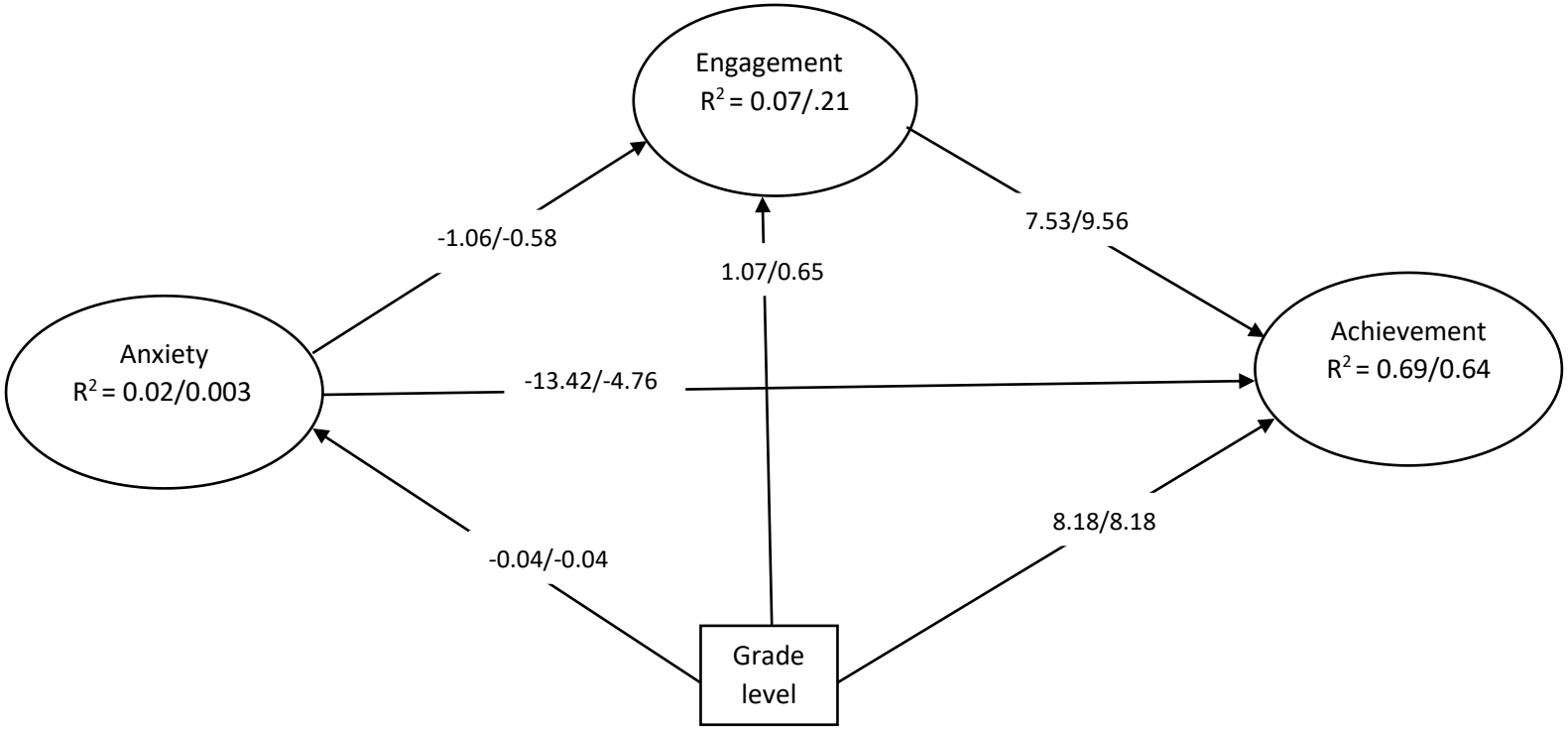

Figure 2. Path diagram depicting multiple group SEM with partial mediation effect of reading engagement on the relations of reading anxiety and reading achievement (DLLs/ESs).

Reading Anxiety, Engagement, and Achievement: A Comparison of Dual Language Learners and English Speakers in the Elementary Grades

Supplemental Results: Formation of Latent Variables

Overview

As a preliminary step for the main analyses, which examined mean levels of reading anxiety, reading engagement, and reading achievement and their interrelations dual language learners (DLLs) and English speakers (ESs), we formed a latent variable to represent each construct, and tested the invariance of the structure of each latent model using a confirmatory factor analysis (CFA) approach. Here we describe these preliminary analyses in detail, while in the main manuscript we briefly summarize them.

Reading Anxiety and Reading Engagement

For reading anxiety and reading engagement, the same procedures were used to form latent variables. First, since Likert-scale items were used to measure these constructs, we examined the shapes of the item response distributions. As the distributions were not symmetric, equal distances between adjacent categories could not be assumed and thus, anxiety and engagement were both treated as categorical (specifically ordinal) rather than continuous variables. Accordingly, unidimensional CFA models were then estimated using the diagonally weighted least squares approach with the "Delta" parameterization (Muthen & Asparouhov, 2002). Listwise deletion was necessary given the use of categorical variables. For anxiety, the indicators were the six items comprising the anxiety scale. For engagement, the indicators were the 8 items comprising the REI. Item residuals were covaried based on conceptual and statistical considerations. Table 1

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ES	-4.76	1.75	.007	-5.51	1.43	<.001	-10.27	2.25	<.001

Note. RE = reading engagement. and S2 provide path diagrams of the latent structures of anxiety and engagement. Model fits for the latent variables are summarized in Table S1. The relative and absolute model fit indices consulted to select models from this and subsequent analyses were as follows:

1) Chi-square goodness-of-fit statistic: Smaller, non-statistically significant values indicate better fit. The expected value is equal to the model's degrees of freedom. When comparing nested models, a significant change in the chi-square statistic indicates that the less constrained model fits better; a nonsignificant change in chi-square supports selection of the more constrained model (Hu & Bentler, 1999; Kline, 2016).

2) Root mean square error of approximation (RMSEA; Steiger, 2016; MacCallum et al., 1996): Values of .10, .05, and .01 indicate mediocre, good, and excellent fit, respectively. The RMSEA's 90% confidence interval should have a lower bound ≤ .05 and an upper bound ≤ .10.

3) Standardized root mean square residual (SRMR; Hu & Bentler, 1999): Values ≤ .08 indicate good fit.

4) Comparative fit index (CFI; Bentler, 1990): Values ≥ .95 indicate good fit. The index may range from 0-1; 1 indicates perfect fit.

5) Tucker-Lewis index (TLI; Bentler & Bonett, 1980; Tucker & Lewis, 1973): Same criteria applies as for the CFI. This index, however, may exceed 1.

Table S1

Measurement Model Fit Indices for Reading Anxiety and Engagement

	χ^2	*df*	*p* value	RMSEA [L, U]	SRMR	CFI	TLI
Anxiety	4.972	6	.547	0 [0, .054]	.019	.996	.990
Engagement	51.188	16	<.001	.067 [.047, .088]	.030	.991	.984

Note. Since the models were estimated using the diagonally weighted least squares estimator, the scaled versions of the corresponding fit indices are reported. RMSEA = root mean square error of approximation. L= lower bound of 90% confidence interval. U = upper bound of 90% confidence interval. SRMR = standardized root mean square residual. CFI = comparative fit index. TLI = Tucker-Lewis index.

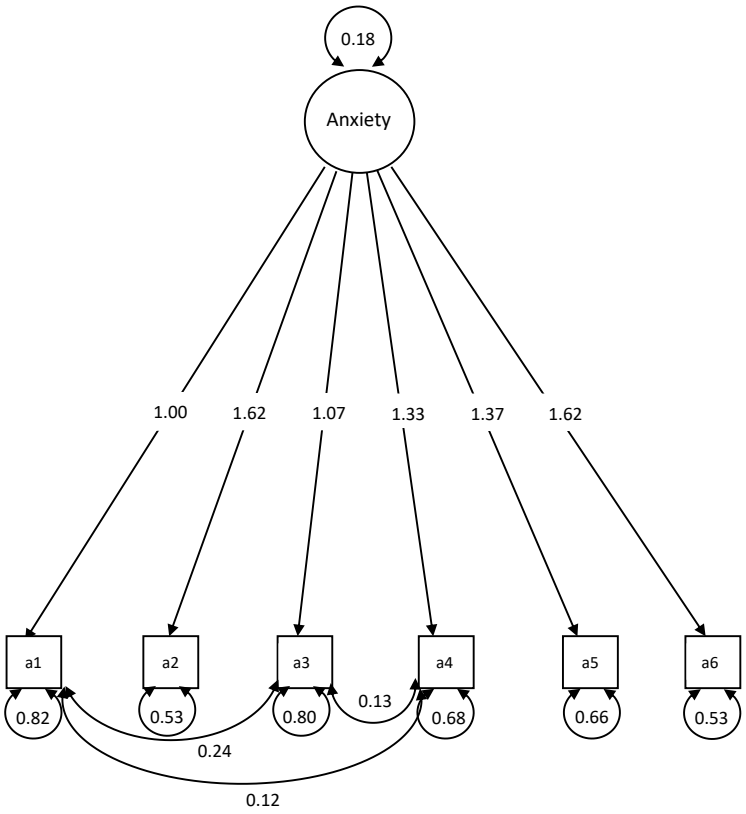

Figure 1. Path diagram depicting latent reading anxiety variable.

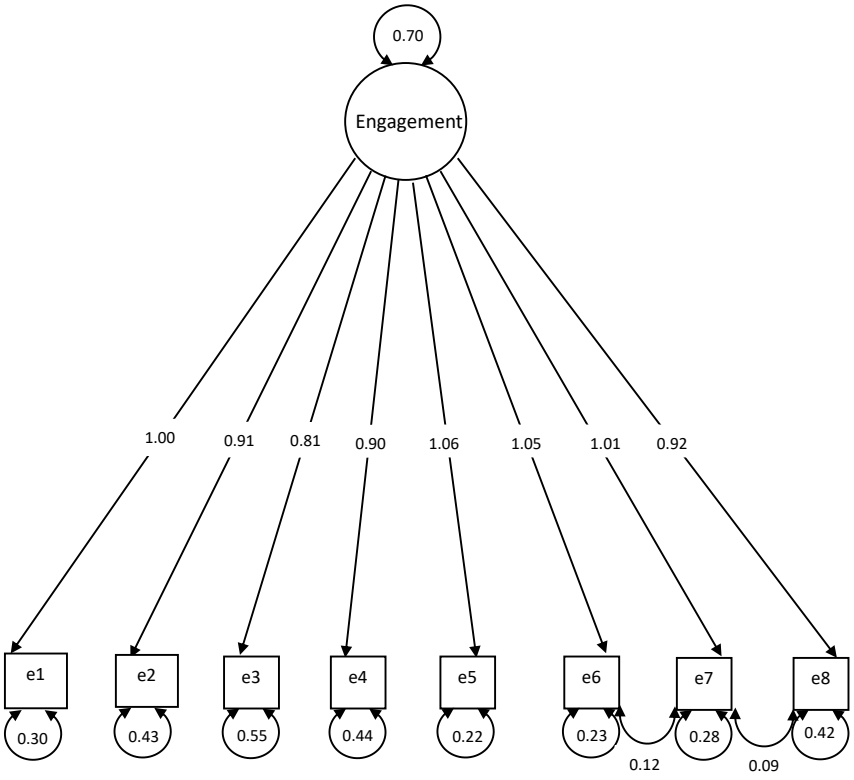

Figure 2. Path diagram depicting latent reading engagement variable.

For reading anxiety, model fit was good across all indices. For reading engagement, most indices (SRMR, CFI, TLI, and the 90% confidence intervals for the RMSEA) indicated good model fit For anxiety and engagement, respectively, the coefficient omega reliability values (McDonald, 2013) were .74 and .93.

Next, to prepare for comparing the language groups' means on the latent constructs, we investigated measurement invariance using Wu and Estabrook's (2016) approach for ordinal response data. Three nested models were fitted and compared for each construct: (1) a baseline configural model, in which the model is fit separately for each group without constraints; (2) a weak model, in which only the threshold parameter (representing the expected value of a latent variable at which an individual transitions from adjacent categories) is constrained; (3) a strong

model, in which the threshold and loadings are constrained. Model fit indices are summarized in Table S2.

For reading anxiety, Model 2 fit better than Model 1 based on the chi-square difference test, $\Delta\chi^2 = 6.444, df = 6, p = .375$, the RMSEA, and TLI. Model 3 , in turn, fit better than Model 2, $\Delta\chi^2 = 3.906, df = 5, p = .563$, with slight advantages also in the RMSEA, TLI, and CFI. Thus, anxiety demonstrated measurement invariance across groups, as Model 3, with both the threshold and loadings constrained to be equal, showed the best fit.

For reading engagement, Model 1 fit well based on the SRMR, CFI, and TLI, but not on the chi-square statistic or RMSEA. Model 2, which showed the same pattern of fit statistics, did not improve model fit, $\Delta\chi^2 = 52.532, df = 16, p < .001$. Likewise, Model 3 did not improve model fit based on the chi-square difference test, $\Delta\chi^2 = 22.242, df = 7, p = .002$. However, Model 3 improved the absolute model fit over both these, as the RMSEA for Models 1 and 2 was, respectively, .023 and .019 greater than for Model 3; that is, these differences being greater than .01 suggested that Model 3 fit better than the other models (Chen, 2007). Further, the other fit indices suggested that Model 3 fit reasonably well, except the chi-square value, which may, however, be overly sensitive to sample size (Bagozzi, 1977; Bentler & Bonett, 1980) and an inflated Type I error rate (Yuan & Chan, 2016) (see Table S2). Overall, then, the analysis indicated that measurement invariance held for reading engagement.

Table S2

Measurement Invariance Model Comparison Results for Latent Variables

	χ^2	*df*	*p* value	RMSEA [L, U]	SRMR	CFI	TLI	AIC	BIC
Anxiety									
Model 1: Unconstrained (configural)	14.978	12	.243	.033 [0, .078]	.026	.996	.991		
Model 2: Threshold constrained (weak)	21.422	18	.259	.029 [0, .068]	.026	.996	.993		
Model 3:Threshold and loadings Constrained (strong)	**25.328**	**23**	**.334**	**.021 [0, .059]**	**.030**	**.997**	**.996**		
Engagement									
Model 1: Unconstrained (configural)	114.43	30	<.001	.107 [.087, .128]	.026	.993	.988		
Model 2: Threshold constrained (weak)	166.96	46	<.001	.103 [.087, .120]	.026	.991	.989		
Model 3: Threshold and loadings (strong) constrained	**144.72**	**53**	**<.001**	**.084 [.068,.100]**	**.026**	**.993**	**.992**		
Achievement									
Model 1: Unconstrained (configural)[a]	0	0		0 [0, 0]	0	1.000	1.000	12708.49	12784.92
Model 2: Loadings constrained (weak)	1.26	2	.532	0 [0, .108]	.019	1.000	1.002	12705.75	12773.68
Model 3: Loadings and intercept constrained (strong)	3.60	4	.463	0 [0, .090]	.025	1.000	1.001	12704.09	12763.53
Model 4: Loadings, intercept, and residuals constrained (strict)	**10.08**	**7**	**.184**	**.041 [0, .0930]**	**.047**	**.997**	**.997**	**12704.56**	**12751.27**

Note. Selected models are bold-faced. Since the anxiety and engagement models were estimated using the diagonally weighted least squares estimator, the scaled versions of the corresponding fit indices are reported for them; original index values are reported for achievement.

RMSEA = root mean square error of approximation. L= lower bound of 90% confidence interval. U = upper bound of 90% confidence interval. SRMR = standardized root mean square residual. CFI = comparative fit index. TLI = Tucker-Lewis index. AIC = Akaike Information Criteria. BIC = Bayesian Information Criteria. AIC and BIC are unavailable for ordinal models such as the anxiety and engagement models.

[a] This is a saturated model, and thus has perfect fit.

Reading achievement. To form the latent reading achievement variable, a unidimensional CFA model was estimated using the full information maximum likelihood estimator assuming missing at random. Three continuous indicators were loaded on the latent factor: WJ-IV word identification and passage comprehension, and GMRT reading comprehension. Table 1

Sample Demographics

	Full sample (%) (n = 517)	Dual Language Learners (%) (n = 339)	English Speakers (%) (n = 178)
Grade			
Third	31.4%	33.1%	27.9%
Fourth	32.2%	33.1%	30.3%
Fifth	36.4%	33.7%	41.8%
FARMS status			
FARMS	84.5%	91.3%	70.7%
No FARMS	15.5%	8.7%	29.3%
Gender			
Female	49.2%	46.1%	55.5%
Male	50.8%	53.9%	44.5%
Ethnicity/race			
Hispanic	64.7%	95.2%	3.0%
Black	26.8%	0.9%	79.3%
White	3.6%	0.9%	9.1%
Multi-racial	2.0%	0.0%	6.1%
Asian	2.8%	3.0%	2.4%

Note. Percentages may not sum to 100 due to rounding.

Table 2

Correlation Matrix and Descriptive Statistics for Study Measures

	RAS	REI	WJ-WI	WJ-RC	GM-RC
RAS	—	-.30***	-.31***	-.26***	-.40***
REI	-.15**	—	.45***	.41***	.43***
WJ-WI	-.28***	.53***	—	.86***	.69***
WJ-RC	-.28***	.49***	.85***	—	.67***
GM-RC	-.30***	.43***	.70***	.68***	—
DLLs					
M	2.67	26.74	476.39	475.82	461.46
SD	0.62	7.53	25.49	16.29	34.97
ESs					
M	2.49	26.81	481.52	482.96	477.79
SD	0.81	8.10	26.99	16.93	40.61

Note. Values for DLLs appear below the diagonal; values for ESs appear above the diagonal. Pairwise deletion was employed. The n for DLLs ranges from 312-331; for ESs, from 159-173. Read. Anx. = Reading Anxiety Scale. REI = Reading Engagement Index. WJ-WI = Woodcock-Johnson IV word identification. WJ-RC = Woodcock-Johnson IV reading comprehension. GM-RC = Gates-MacGinitie reading comprehension.
**$p < .01$. ***$p < .001$.

Table 3

Structural Model Fit Indices for Predicting Reading Achievement from Reading Anxiety and Engagement

	χ^2	*df*	*p* value	RMSEA	SRMR	CFI	TLI
Direct effect only							
Model 1: Anx → Ach constrained	**117.671**	**86**	**.013**	**.042 [.02,.06]**	**.062**	**.970**	**.975**
Model 2: Anx → Ach free	114.881	85	.017	0.041 [.018,.059]	.061	.972	.976
Direct and indirect effects							
Model 1: Anx → Ach, Anx → Eng → Ach constrained	487.605	303	0	.055 [.046,.064]	.067	.983	.985
Model 2: Anx → Ach free; Anx → Eng → Ach constrained	484.212	302	0	.055 [.046,.064]	.066	.983	.985
Model 3: Anx → Ach constrained; Anx → Eng → Ach free	495.452	301	0	.057 [.048,.066]	.067	.982	.984
Model 4: Anx → Ach, Anx → Eng → Ach free	**489.414**	**300**	**0**	**.056 [.047,.065]**	**.066**	**.983**	**.984**

Note. Selected models are bold-faced. RMSEA = root mean square error of approximation. L= lower bound of 90% confidence interval.
U = upper bound of 90% confidence interval. SRMR = standardized root mean square residual. CFI = comparative fit index. TLI = Tucker-Lewis index.

Table 4

Unstandardized Direct, Indirect, and Total Effects of Reading Anxiety on Reading Achievement

	Direct			Indirect through RE			Total		
Group	Effect	*SE*	*p* value	Effect	*SE*	*p* value	Effect	*SE*	*p* value
DLL	-13.42	4.87	.006	-7.99	3.49	.02	-21.41	7.31	.003
ES	-4.76	1.75	.007	-5.51	1.43	<.001	-10.27	2.25	<.001

Note. RE = reading engagement. provides a path diagram of the CFA model. Note that as a saturated model, it has perfect fit indices. McDonald's omega for latent reading achievement was .90.

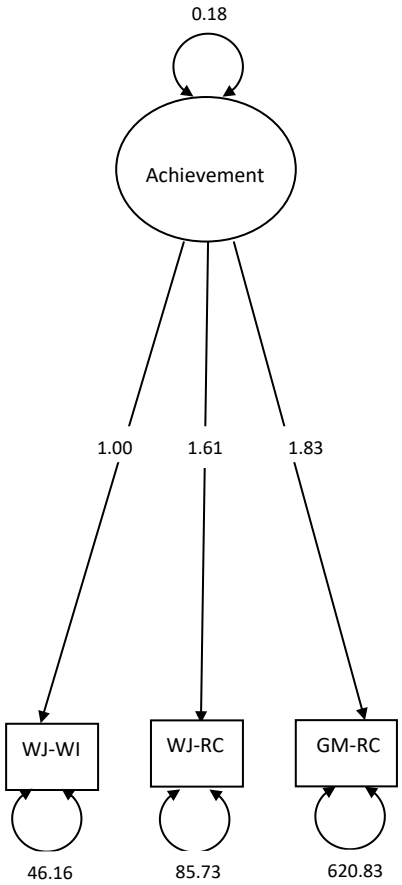

Figure 3. Path diagram depicting latent reading achievement variable. WJ-WI = Woodcock-Johnson IV word identification. WJ-RC = Woodcock-Johnson IV reading comprehension. GM-RC = Gates-MacGintitie reading comprehension.

Next, we examined measurement invariance for reading achievement across language groups by adding constrained loadings, intercepts, and residual variances one at a time. Four nested models were fitted and compared for each construct: (1) a baseline configural model, in which the model was fit separately for each group without constraints; (2) a weak invariance model in which only the loadings were constrained to be equal; (3) a strong invariance model in which the loadings and intercept were constrained; (4) a strict invariance model, in which the loadings, intercept, and residual variances were constrained.

Model fit indices are summarized in Table S2. For reading achievement, Model 1 was a saturated model, and thus fit perfectly. Model 2 fit well based on the absolute fit indices and was preferable to Model 1 based on its lower AIC and BIC values and the chi-square difference test, $\Delta\chi^2 = 1.262$, $df = 2$, $p = .532$. Model 3, in turn, showed lower AIC and BIC values than Model 2, and was also preferable to Model 2 based on the chi-square difference test, $\Delta\chi^2 = 2.340$, $df = 2$, $p = .310$. Further, Model 4 did not fit significantly more poorly than Model 3, $\Delta\chi^2 = 6.474$, $df = 3$, $p = .091$. The BIC was also lower for Model 4 than Model 3, supporting the former, and had good fit based on the other indices (see Table 4). Therefore, we concluded that strict measurement invariance held for reading achievement across language groups.

References

Bagozzi, R. P. (1977). Structural equation models in experimental research. *Journal of Marketing Research*, *14*(2), 209-226. doi:10.2307/3150471

Bentler, P. M. (1990). Comparative fit indexes in structural models. *Psychological Bulletin*, *107*(2), 238-246. doi:10.1037/0033-2909.107.2.238

Bentler, P. M., & Bonett, D. G. (1980). Significance tests and goodness of fit in the analysis of covariance structures. *Psychological Bulletin*, *88*(3), 588-606. doi:10.1037/0033-2909.88.3.588

Chen, F. F. (2007). Sensitivity of goodness of fit indexes to lack of measurement invariance. *Structural Equation Modeling: A Multidisciplinary Journal*, *14*(3), 464-504. doi:10.1080/10705510701301834

Hu, L. T., & Bentler, P. M. (1999). Cutoff criteria for fit indexes in covariance structure analysis: conventional criteria versus new alternatives. *Structural Equation Modeling: A Multidisciplinary Journal*. *6*(1), 1-55. doi:10.1080/10705519909540118

Kline, R. B. (2016). *Principles and practice of structural equation modeling* (4th ed.). New York, NY: Guilford Press.

MacCallum, R. C., Browne, M. W., & Sugawara, H. M. (1996). Power analysis and determination of sample size for covariance structure modeling. *Psychological Methods*, *1*(2), 130-149. doi:10.1037/1082-989x.1.2.130

McDonald, R. P. (2013). *Test theory: A unified treatment*. Psychology Press. doi:10.4324/9781410601087

Muthén, B., & Asparouhov, T. (2002). Latent variable analysis with categorical outcomes: Multiple-group and growth modeling in Mplus. *Mplus web notes*, *4*(5), 1-22. Retrieved from https://www.statmodel.com/download/webnotes/CatMGLong.pdf

Steiger, J. H. (2016). Notes on the Steiger–Lind (1980) handout. *Structural Equation Modeling, 23*(6), 777–781. https://doi.org/10.1080/10705511.2016.1217487

Tucker, L. R., & Lewis, C. (1973). A reliability coefficient for maximum likelihood factor analysis. *Psychometrika*, *38*(1), 1-10. doi:10.1007/bf02291170

Wu, H., & Estabrook, R. (2016). Identification of confirmatory factor analysis models of different levels of invariance for ordered categorical outcomes. *Psychometrika*, *81*(4), 1014-1045. doi:10.1007/s11336-016-9506-0

Yuan, K. H., & Chan, W. (2016). Measurement invariance via multigroup SEM: Issues and solutions with chi-square-difference tests. *Psychological Methods*, *21*(3), 405-426. doi:10.1037/met0000080