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Moving Forward by Looking Back: Understanding Why Some Spanish-Speaking English Learners Fall Behind

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Abstract

This study investigated early indicators of Spanish-speaking English learners (ELs) at risk for reading difficulties at the end of Grade 2 by examining their early bilingual oral language development, taking into account language of academic instruction. Standardized measures of reading and narrative samples were collected in English and Spanish from kindergarten to Grade 2 from 1,243 ELs primarily instructed in English or Spanish. Conditional growth curve models yielded four primary findings of reading and oral language development. First, ELs with low reading achievement at the end of Grade 2 demonstrated early reading difficulties during kindergarten. Second, although ELs demonstrated overall higher reading achievement in their instructed language, this difference decreased over time. Third, ELs with low reading achievement at the end of Grade 2 demonstrated lower oral language skills in each language over time. Fourth, ELs demonstrated overall higher oral language skills in their instructed language, yet these differences varied over time. The study provided a detailed description of the longitudinal relations among the bilingual reading and oral language skills of Spanish-speaking ELs during the early school years. These findings help to inform the processes of early identification and intervention for Spanish-speaking ELs who are likely to demonstrate reading achievement difficulties.

Numerous studies show that on average, children who enter schools in the United States speaking languages other than English as their native language, and who are categorized as English learners (ELs), tend to lag behind in academic achievement relative to native English speakers (Chu & Flores, 2011; see Klingner, Boardman, Eppolito, & Schonewise, 2012, for a review). In fact, the definition of EL status implies insufficient skills in English; specifically, EL children are deemed to lack sufficient English skills necessary to succeed independently in English-only classrooms. Spanish-speaking ELs comprise the majority (>75%) of all EL students, and are more likely to (a) be at risk for low academic achievement, (b) attend public schools and score lower on state tests than their native English-speaking peers, and (c) interact with other students who primarily live at or below the poverty line (Fry, 2008; Gorman, 2009; see Klingner et al., 2012, for a review; Kieffer & Lesaux, 2008). Furthermore, many EL students are also in classrooms with high student-to-teacher ratios and instructed by teachers who lack training in how to best serve EL children, all of which have been associated with gaps in academic achievement as compared to their monolingual English-speaking peers (Fry, 2008; see Klingner & Soltero-Gonzaléz, 2009, for a review). Although EL children are more likely to come from environments considered to be at risk, many studies of EL, minority children have included participants that were not

necessarily from low socioeconomic households (Gardner-Neblett & Iruka, 2015; Gorman, 2009). This study uses a large-scale, longitudinal sample of Spanish-speaking EL participants more representative of the EL population in the United States to conduct analyses that will be more generalizable to the growing population of ELs nationwide.

Academic Lag in Spanish-Speaking ELs

In the United States, some states require that children pass basic reading fluency and comprehension tasks in the third grade to proceed to fourth grade. Schools are increasingly demanding more stringent assessment of students' literacy skills. Consequently, ELs are at risk of falling even further behind academically relative to their monolingual English-speaking peers. Although these new requirements have exemptions for students with learning disabilities, EL students with typical development are expected to meet state standards. However, many EL students may lack the requisite linguistic and literacy knowledge of the English language needed to pass these assessments, even with appropriate accommodations. This is particularly evident in the area of reading comprehension (Kieffer & Lesaux, 2008; see Klingner et al., 2012, for a review; Menken & Kleyn, 2010; Nakamoto, Lindsey, & Manis, 2007). Consequently, reading disabilities are more likely to be misdiagnosed in ELs, including both over- and under-identification, due to a paucity of research on the subject and inadequate training of teachers and diagnosticians working with this population (Gorman, 2009; see Klingner & Soltero-Gonzaléz, 2009, for a review).

In the interest of minimizing the number of typically developing children from failing these state mandated tests, this study will investigate potential early indicators of Spanish-speaking EL students who are at risk for reading difficulties in English and or Spanish prior to entering Grade 3 by examining the development of their bilingual oral language skills starting from kindergarten. Oral language skills such as vocabulary knowledge have been suggested to strongly impact reading comprehension in monolinguals and bilinguals (Lesaux & Kieffer, 2010; Mancilla-Martinez & Lesaux, 2011); it is important to note that this study examines the longitudinal development of oral language and reading skills during the key period of early elementary (kindergarten to Grade 2) when expectations of reading achievement begin to shift from decoding and fluency to comprehension. This study will also lay the groundwork for more precisely understanding the impact of different programs of language instruction on bilingual reading and oral language skills, thereby informing strategies for early intervention with this rapidly growing population of students.

ELs tend to lag behind their monolingual peers in both reading and math; however, a greater proportion of ELs fall behind in reading skills as compared to math, which will be the focus of this study. The nationwide proportion of ELs who are below the minimal level of proficiency in fourth grade reading assessments has been estimated to be as high as 68% (National Center for Education Statistics, 2015). It is of critical importance that researchers find ways to identify ELs at risk for falling below minimal levels of reading proficiency, as the academic achievement gap (particularly in reading comprehension) between EL students and their non-EL peers has been shown to widen around third grade. For instance, a longitudinal study of 173 Spanish-speaking students in English-only classrooms found that although the students demonstrated grade-appropriate letter-word identification skills

throughout, their oral language skills (picture naming; verbal short-term language memory) began below expectations in preschool and did not grow fast enough to reach grade-appropriate levels by Grade 5 (Mancilla-Martinez & Lesaux, 2011). Another longitudinal study of 261 Spanish-speaking ELs (Grade 1 to 6) in transitional bilingual education programs found that their reading comprehension, but not their decoding skills, began to fall below grade-appropriate levels at Grade 3 (Nakamoto et al., 2007). Differentiating the reasons why EL children perform differently from their monolingual English-speaking peers is also important to better understand the nature of literacy and language development in EL children.

Predicting Reading Ability and Narrative Language Sampling

Previous research on ELs and their reading skills has found that some predictors of reading ability were phonological processing, letter identification, decoding, nonword repetition, syntactic awareness, and oral language skills (Gorman, 2009; Lervag & Aukrust, 2010; Nakamoto et al., 2007; Miller et al., 2006). Although prior research has used language as a predictor of reading skills, the majority of existing studies have used standardized measures of vocabulary in the form of picture naming tasks such as the Peabody Picture Vocabulary Test, and the Woodcock Muñoz Language Proficiency Battery (Lervag & Aukrust, 2010; Mancilla-Martinez & Lesaux, 2011; Nakamoto, Lindsey, & Manis, 2012). Picture naming tasks are arguably less representative of overall expressive oral language skills than oral narrative language tasks, which can capture a wider range of functional oral language skills such as morphosyntax, lexical diversity, and verbal fluency. Miller et al. (2006) examined a variety of expressive language measures from oral narrative language samples produced by more than 1,500 EL students in kindergarten through Grade 3. This large-scale, cross-sectional study found that measures of expressive morphosyntactic complexity, vocabulary, and verbal fluency significantly predicted outcomes in reading comprehension and word reading in both English and Spanish. However, there is a critical need for longitudinal research on Spanish-speaking ELs, because only by following the same children over time can one determine whether there is a longitudinal relation between early oral language skills and later success or difficulties with reading achievement (Hammer et al., 2014; Kieffer & Lesaux, 2008; Miller et al., 2006).

The purpose of the present study is to understand more precisely why some Spanish-speaking ELs lag behind others in their bilingual literacy skills across specific programs of language instruction. Large-scale, longitudinal data from different program types are necessary to capture differences at various times throughout the early school years. The present study analyzes the longitudinal relation between oral narrative language skills and reading skills, as a lack of proficiency in oral language has been shown to be a risk factor for reading and academic success in later school years (Halle, Hair, Wandener, McNamara & Chien, 2012; Lesaux & Kieffer, 2010; Mancilla-Martinez & Lesaux, 2011; Nakamoto et al., 2007). The results of the present study address the gaps in the literature on the reasons why some ELs lag behind non-ELs academically, and the differences among these children as a function of their language of academic instruction.

Narrative language samples can be used as a functional measure of the oral language abilities of school-age children by providing a rich and robust sample of overall expressive language skills. Skills measured through the use of narrative language samples are the same skills necessary for literacy success in both English and Spanish (Bedore & Peña, 2008). Producing a narrative requires the use of sequential and referential language, as well as an understanding of causal and temporal relationships, which are common factors in most children's books. Narrative language sample measures are highly correlated with literacy skills in monolingual and bilingual children, and improvements in narrative skills can lead to improvements in literacy (Gardner-Neblett & Iruka, 2015; Gorman, Bingham, Fiestas, & Patton Terry, 2016). Furthermore, narrative language samples possess a range of unique properties: (a) they provide an accurate sample of expressive language skills; (b) have been shown to be predictive of literacy skills within and across languages (Miller et al., 2006); and (c) can be least-biased depending on the materials used for narrative elicitation, considering the relevance and familiarity across cultures. Relatedly, book-sharing and storytelling activities are helpful contexts for early childhood communication and are closely linked with preliteracy skills.

Programs of Language Instruction for ELs

It is now widely acknowledged that EL students are at a disadvantage to learn the core curriculum and pass state mandated assessments. Consequently, specialized classrooms and instructional methods are offered specifically for EL students in U.S. public schools. Three of the most common programs of language instruction in the United States are transitional bilingual education (TBE), dual language, and structured English immersion (SEI). Each of these distinct programs has specific goals with regard to developing literacy skills only in English (SEI) or in two languages (TBE; dual language), one of them being English (Swanson, 2009). Author reference (this issue) provides a more detailed description of the types of programs and the distinctions between them.

A number of recent studies have investigated contributors to literacy and reading outcomes of EL students in different educational settings where either the children's first (TBE, dual language) or second language (SEI) was primarily used for academic instruction (Manis et al., 2004; Menken & Kleyn, 2010; Nakamoto et al., 2012). Manis et al. analyzed the same Spanish-speaking EL students attending TBE programs in south Texas from kindergarten to the first grade. These studies predicted reading outcomes with multiple predictors, including phonological awareness. Linguistic transfer was found from the first to the second language (L1 and L2, respectively) for phonological awareness and letter knowledge (Anthony et al., 2009; Branum-Martin, Tao, Garnaat, Bunta, & Francis, 2012; Kim, 2009). Manis et al. (2004) found that oral language was predictive of reading skills in both L1 and L2; specifically L1 and L2 oral language skills were found to be stronger within-language predictors for reading than cross-linguistically for this group of students. Nakamoto et al. (2012) studied developmental language and reading skills of Spanish-speaking ELs in TBE, dual language, and SEI programs from kindergarten to Grade 3. They found that there was no significant difference between TBE and dual language academic settings, and that the predictors of reading skills (e.g., listening comprehension, expressive vocabulary) did not differ for those programs. Menken and Kleyn (2010) studied ELs in English-only academic

settings in grades 9–12. They found that ELs in English-only instruction were not likely to have L1 literacy skills, and were less likely to have strong L2 literacy skills. They attributed this lack of strong literacy skills to having fewer opportunities to use academic vocabulary in both L1 and L2. In the present study, we include language of instruction in our models because research has shown that language and literacy skills in L1 and L2 develop differently depending on the language of instruction. Our interest here is not to debate the merits of different instructional models, but simply to allow for the fact that development varies conditional on this important dimension of children's educational experience.

Present Study

The academic gap between EL and non-EL students in U.S. schools has been shown to grow even wider after the third grade, so it is of great importance to be able to identify EL students with the greatest risk early on (Nakamoto et al., 2007). While this difference stems at least in part from the relation between achievement and language proficiency and the ubiquitous practice of removing students from the EL category when students become proficient in English (Saunders & Marchelletti, 2013), the gap in achievement is not entirely due to problems in reporting. Although oral language skills have been shown to predict later reading outcomes in ELs (e.g., Davison, Hammer, & Lawrence, 2011; Miller et al., 2006; Nakamoto et al., 2012), this study is the first that systematically examines the predictive relations between oral language development and reading skills (a) with a large-scale longitudinal sample of over 1,000 Spanish-speaking ELs from lower socioeconomic households across a variety of programs of language instruction; (b) including narrative oral language samples; and (c) during the key period of early elementary (kindergarten to Grade 2) when expectations of reading achievement begin to shift from decoding to comprehension. The present study aims to differentiate patterns of growth and development in language and literacy and to understand the role of language of instruction as a factor in the development of reading outcomes over time. The longitudinal design of this study offers a methodological advantage over cross-sectional research, because the students' abilities are likely to vary over time.

This study adds to the current knowledge base of determining potential early indicators of the EL reading lag by addressing two primary research aims. First, do Spanish-speaking ELs who demonstrate low reading achievement at the end of Grade 2 also demonstrate differential development from the beginning of kindergarten? Second, what characterizes the growth of narrative oral language skills for Spanish-speaking ELs who demonstrate low reading achievement at the end of Grade 2? Both research aims will also evaluate the impact of language of instruction. It is hypothesized that ELs who have low reading achievement at the end of Grade 2 will demonstrate differential development from the beginning of kindergarten characterized by difficulties over time with reading skills relative to their EL peers who demonstrate grade-appropriate reading skills at the end of grade 2, and that such differences will hold across programs of language instruction. ELs with low reading achievement at the end of Grade 2 are hypothesized to also demonstrate low oral language skills beginning in kindergarten relative to their EL peers with grade-appropriate reading skills at the end of Grade 2. These effects of oral language will be evidenced across both programs of language instruction.

Method

The present study used longitudinal data from the *Oracy/Literacy Development of Spanish-Speaking Children* (Francis et al., 2005) project. This multiyear project assessed Spanish-speaking ELs each semester (fall and spring) from kindergarten to Grade 2, yielding six total waves of observation. The EL students attended a range of programs of language instruction (TBE; dual language; and SEI) in California and Texas, and had not been diagnosed with any severe disabilities (e.g., deafness, blindness, intellectual) at the start of kindergarten. Francis et al., (2019) provides complete information regarding this longitudinal project.

Participants and Observations.

This study's final dataset included 1,243 Spanish-speaking EL students who were assessed from kindergarten through Grade 2 on the broad reading cluster in English (BRE) and Spanish (BRS) of the Woodcock Language Proficiency Battery-Revised (Woodcock, 1991; Woodcock & Muñoz-Sandoval, 1995) (WLPB-R), and who provided narrative retell language samples in both languages. In total, the students provided 8,548 observations from the BRE (n = 4,304) and BRS (n = 4,244), and 10,167 narrative retell language samples in English (n = 4,913) and Spanish (n = 5,254). Although none of the students were administered the reading subtests of the WLPB-R during kindergarten, they provided narrative language samples at each wave of observation, which primarily accounts for the difference between the total observations from each task. The final dataset was relatively balanced with respect to gender within each wave of observation (neither gender comprised >52% at any given wave), as well as across the duration of the longitudinal project (boys = 50.2%; girls = 49.8%). Two programs of bilingual academic instruction (TBE; dual language) were collapsed into programs of Spanish instruction, as Spanish academic instruction is emphasized in each of these bilingual programs from kindergarten through Grade 2. The proportion of students instructed in English and those in Spanish was relatively consistent in the final dataset within each wave of observation (English instruction ranged from 30% to 32% at any given wave), as well as across the duration of the longitudinal project (English instruction = 30.3%; Spanish instruction = 69.7 %). The majority of students (98%) remained in the same programs of language instruction for the duration of the study. Descriptive data are summarized in Table 3.1.

Longitudinal Sampling Protocol.

Students were assessed in the fall and spring semesters of each academic year with a variety of measures and methods in English and Spanish. This study focused on the W-score performance on the BRE and BRS of the WLPB-R at the end (spring semester) of Grade 2, and on narrative language sample production in both languages from kindergarten to Grade 2.

The administration of the WLPB-R occurred toward the beginning of the fall semesters, and toward the end of the spring. Participants were first administered the WLPB-R in their strongest language as determined by the examiners through informal interaction with each child preceding testing. Children were assessed on the WLPB-R in their other language

approximately 1 week later. The examiners were trained extensively to administer the WLPB-R in Spanish and English, and were proficient speakers of both languages.

Narrative language samples were collected primarily during October and May, ensuring that participants had been exposed to at least 1 month of their respective language(s) of academic instruction prior to assessing them. The participants were asked to retell one of a series of wordless picture storybooks, commonly known as the *Frog Stories:* (a) *Frog, Where Are You?* (Mayer, 1967); (b) *Frog Goes To Dinner* (Mayer, 1974); (c) *Frog On His Own* (Mayer, 1975a); and (d) *One Frog Too Many* (Mayer, 1975b). To promote task familiarity, assessment was first conducted in the child's strongest language, followed 1 week later by assessment in the weaker language. When students were assessed in their weaker language, examiners could provide instructions to the child in the stronger language and answer questions about procedures in either language to ensure that students understood the task and what they were expected to do. All examiners were trained in the narrative retell elicitation protocol, and were proficient bilingual (English–Spanish) speakers.

The narrative language samples were recorded onto digital media and transcribed by trained Spanish–English bilingual transcribers following the conventions for bilingual oral language samples using the Systematic Analysis of Language Transcripts Research 2010 (SALT; Miller & Iglesias, 2010) software program. Protocol accuracy (adherence to SALT transcription conventions) and transcription accuracy (segmentation of utterances) were calculated for twenty English and twenty Spanish language samples, randomly selected from the parent study. Based on independent ratings, protocol accuracy ranged from 98% to 100% in English and 94% to 99% in Spanish. Transcription accuracy ranged from 90% to 98% in English and 91% to 99% in Spanish (Miller et al., 2006).

Measures.

WLPB-R: Broad Reading Cluster.—The Broad Reading Cluster of the WLPB-R is a broad measure of reading achievement. This cluster is a combination of measures of reading identification, comprehension, and vocabulary skills. This cluster consists of three subtests: Letter-Word Identification, Word Attack, and Passage Comprehension. Author reference (this issue) provides additional information regarding the BRE and BRS. Low achievement W-score performance in the broad reading cluster in each language (BRE, BRS) was identified using a cut-point at the 20th percentile rank at the end of Grade 2 for the students in the longitudinal project. The 20th percentile rank reflects "low typical" performance capturing ELs who score at or below the 20th percentile relative to their peers, approximating performance that is on the borderline of falling more than 1 standard deviation below the mean. In other words, ELs scoring at or below the 20th percentile at the end of Grade 2 are the ones who are likely to present with reading achievement difficulties before they enter the third grade. Table 3.1 specifies the proportion of students who were categorized as being at or below the 20th percentile at the end of Grade 2 in either the BRE or the BRS. The degree of overlap for students categorized at risk in both languages (BRE and BRS) was minimal (only 3%) at the end of Grade 2.

Bilingual Language Sample Analysis Measures.—Three language sample analysis (LSA) measures were selected to quantify morphosyntactic and lexical skills, as well as the integration of these skills used during narrative production: (a) mean length of utterance in words (MLUw); (b) number of different words (NDW); and (c) words per minute (WPM) in English and Spanish. These LSA measures have consistently been shown to be developmentally sensitive in cross-sectional (Miller et al., 2006) and longitudinal (Rojas & Iglesias, 2013) studies with ELs, and are positively related to the bilingual reading achievement of ELs (Miller et al., 2006).

MLUw was used to measure gross morphosyntactic skills. MLUw is not affected by varying degrees of inflection across languages and is therefore preferred for reliably assessing gross morphosyntactic skills in Spanishs-peaking ELs (Bedore & Peña, 2008). MLUw was calculated by dividing the total number of intelligible words produced in a language sample by the number of complete and intelligible utterances.

NDW, the total number of different uninflected word roots, was used to measure lexical skills. NDW, which reflects the diversity of vocabulary (Paul & Norbury, 2012), is a developmentally sensitive measure of overall productivity in Spanish-speaking ELs and is significantly correlated with age (Uccelli & Páez, 2007). NDW was calculated by summing the number of different uninflected word roots in the target language for that sample; word roots in the nontarget language were excluded.

The number of words produced per minute (WPM), a measure of verbal fluency, was used to represent the overall integration of morphosyntactic and lexical skills necessary for oral language production (Miller et al., 2006). WPM has been positively associated with the age and increasing proficiency in English of EL children (Miller & Heilmann, 2004), and correlated with age of initial exposure to English (Guion, Flege, Liu, & Yeni-Komshian, 2000). WPM was calculated as the total number of words (NTW) produced in each sample divided by the duration of that language sample in seconds divided by sixty (i.e., (WPM = NTW/(Seconds/60)).

Analytic Approach.

All analyses were conducted with SPSS Statistics 24.0 for Mac. Conditional growth curve modeling was used to model the growth of the broad reading cluster in each language (BRE, BRS), and the three LSA measures (MLUw, NDW, WPM) in English and Spanish. Covariates included low reading achievement at the end of Grade 2 (20th percentile) and type of language instruction (Spanish or English). Maximum likelihood estimation was used to handle missing data and estimate fixed effects (intercept, growth rates) and variance components. Academic semester was the time metric, which was scaled according to the time in months that spanned between consecutive waves of observation: 7 months in between the fall of one calendar year (October) and the spring of the next (May) (i.e., within academic year), and 5 months in between the spring and the fall of the same calendar year (i.e., across academic years). A primary focus of this study was to better understand what characterizes students with low reading achievement at the end of Grade 2. Thus, as recommended by Biesanz, Deeb-Sosa, Padakis, Bollen, and Curran (2004, p. 41) when “it is important to understand effects and relationships at the end of the assessed growth process,”

time was centered at the end (spring semester) of Grade 2 (semester—31 months). It is important to note that such centering impacted the interpretation of the intercept as the expected performance at the end (spring semester) of Grade 2, and of the slopes because growth was found to be curvilinear. In such cases, the slope is proportional to the instantaneous rates of growth at the centering point.

A series of models (unconditional means, unconditional growth, and conditional growth models) were tested for each measure per language, including the (a) estimation of fixed effects and variance components, (b) testing of the highest overall proportional variance reduction in residual variance at the within- and between-person levels of each model, and (c) comparison of goodness-of-fit indices across models to determine the best fitting models (Singer & Willett, 2003). The unconditional and conditional growth models were compared across linear, quadratic, and cubic polynomial functions with random intercepts and fixed slopes. In order to identify the best fitting growth model, the best fitting unconditional growth model for each measure was used as the baseline model for comparison of the conditional growth models for each measure. A series of conditional growth models were compared for each measure, which included the effect of scoring at or below the 20th percentile on the BRE or BRS at the end of Grade 2, and being English-instructed, on initial status (intercept) only, on the linear growth rate (slope) only, and on initial status and linear growth rate. The smallest —2 log-likelihood deviance statistic (—2LL) and Schwarz' Bayesian information criterion (BIC) were used to compare overall model fit and the relative improvement between models (Nakamoto et al., 2007; Singer & Willett, 2003). Statistical significance of the —2LL differences between models was determined using χ^2 distribution. The final models for each measure, which were conditional growth models, accounted for the most variance (highest proportional variance reductions) and achieved the best fit (lowest goodness-of-fit indices) to the longitudinal data for each measure. The growth curve trajectories for each measure were based on the fixed effects (intercept and slopes) from the final conditional growth curve model for each measure.

Results

Reading Achievement.

Conditional growth curve models (GCMs) were estimated to determine if ELs who scored ≤20th percentile on BRE and BRS at the end of Grade 2 demonstrated differential development from the beginning of kindergarten, and how their longitudinal reading achievement was impacted by program of language instruction.

Table 3.2 outlines the best fitting, conditional GCMs for BRE and BRS, indicating that both reading achievement measures exhibited curvilinear (quadratic for BRE; cubic for BRS) growth over time. Compared to the best fitting unconditional growth model (quadratic with random intercepts), the final conditional quadratic growth model with random intercepts for BRE demonstrated the highest overall proportional variance reduction of within-person residual variance (pseudo-R_ε^2, 80% improvement), and of between-person residual intercept variance (pseudo-R_0^2, 44% improvement), as well as the lowest goodness-of-fit deviance statistic (—2LL = 35,499.6, $p < .001$ for a distribution on 4 *df*) and the smallest BIC

(35,574.9). Compared to the best fitting unconditional growth model (cubic with random intercepts), the final conditional cubic model with random intercepts for BRS demonstrated the highest overall proportional variance reduction of within-person residual variance (61% improvement), and of between-person residual intercept variance (73% improvement), as well as the lowest goodness-of-fit deviance statistic (—2LL = 37,288.3, $p < .001$ for a χ^2 distribution on 4 *df*) and the smallest BIC (37,371.8).

The fixed effects of the final model for BRE (conditional quadratic with random intercepts) indicated that the expected intercept of W-score performance at the end of Grade 2 was $\gamma_{00} = 477$, $p < .001$ for ELs instructed in Spanish who scored above the 20th percentile on the BRE. These students demonstrated a positive and significant instantaneous linear growth rate ($\gamma_{10} = 1.3$, $p < .001$), and an expected rate of deceleration in the linear slope over time ($\gamma_{20} = -0.1$, $p < .001$) that was negative and significant. There was a negative and significant difference in the mean intercept for ELs who scored ≤20th percentile on the BRE at the end of Grade 2 ($\gamma_{01} = -37.4$, $p < .001$) relative to their peers who scored above the 20th percentile, as well as a reduction in their expected linear growth rate by 0.38 ($\gamma_{11} = -0.38$, $p < .001$). Thus, the linear slope at the end of Grade 2 for ELs scoring ≤20th percentile on the BRE was 0.92 (i.e., $\gamma_{10} + \gamma_{11}$), as compared to 1.3 for ELs scoring above the 20th percentile on the BRE. Although there was a positive and significant difference in the BRE intercept for English-instructed ELs ($\gamma_{02} = 4$, $p < .001$), their expected linear growth rate was reduced by 0.75 ($\gamma_{12} = -0.75$, $p < .001$) relative to Spanish-instructed ELs. Thus, the linear growth rate at the end of Grade 2 for English-instructed ELs was 0.55 (i.e., $\gamma_{10} + \gamma_{12}$), as compared to 1.3 for Spanish-instructed ELs. These patterns are consistent with decelerating curvilinear growth, which implies a decrease in the instantaneous growth rate at higher levels of performance.

The fixed effects of the final model for BRS (conditional cubic with random intercepts) indicated that the expected intercept of W-score performance at the end of Grade 2 was $\gamma_{00} = 497.3$, $p < .001$ for ELs instructed in Spanish who scored above the 20th percentile on the BRS. These students demonstrated a positive and significant instantaneous linear growth rate ($\gamma_{10} = 1.6$, $p < .001$), and an expected rate of positive and significant acceleration in the linear slope ($\gamma_{20} = 0.15$, $p = .001$) and in the quadratic slope over time ($\gamma_{30} = 0.01$, $p < .001$). There was a negative and significant difference in the mean intercept for ELs who scored ≤20th percentile on the BRS at the end of Grade 2 ($\gamma_{01} = -59.6$, $p < .001$), relative to their peers who scored above the 20th percentile, as well as a reduction in their expected linear growth rate by 0.91 ($\gamma_{11} = -0.91$, $p < .001$). Thus, the linear slope at the end of Grade 2 for ELs scoring ≤20th percentile on the BRS was 0.69 (i.e., $\gamma_{10} + \gamma_{11}$), as compared to 1.6 for ELs scoring above the 20th percentile on the BRS. Although there was a negative and significant difference in the BRS intercept for English-instructed ELs ($\gamma_{02} = -19.1$, $p < .001$), their expected instantaneous growth rate was significantly higher ($\gamma_{12} = 0.94$, $p < .001$) than that of Spanish-instructed ELs. Thus, the linear growth rate at the end of Grade 2 for English instructed ELs was 2.54 (i.e., $\gamma_{10} + \gamma_{12}$), versus 1.6 for Spanish instructed ELs. This pattern of accelerating growth contrasts with the decelerating growth seen in English reading.

The variance components of the final models for BRE and BRS demonstrated common outcomes after controlling for language of instruction and scoring ≤20th percentile on the BRE or BRS. The variance components indicated that significant within-individual (σ_ε^2) variation remained in BRE and BRS scores over time, and significant between-individual differences in the intercept (σ_0^2) at the end of Grade 2.

Growth Trajectories of Reading Achievement.

Figure 3.1 illustrates the growth curve trajectories of W-scores on the BRE and BRS as a function of language of instruction, and achievement group. This cross-classification resulted in four unique trajectories for the BRE and BRS, for ELs who were (a) instructed in Spanish and scored ≤20th percentile; (b) instructed in Spanish and scored *above* the 20th percentile; (c) instructed in English and scored ≤20th percentile; (d) instructed in English and scored *above* the 20th percentile. In addition, the wave-by-wave estimates resulting from the final models of BRE and BRS are specified in Tables A1 and A2.

The growth trajectories for BRE and BRS were similar to one another. First, the expected growth of ELs on BRE and BRS was curvilinear, indicating positive overall growth. Second, ELs who scored ≤20th percentile on the BRE or BRS at the end of Grade 2 demonstrated less overall positive growth over time as opposed to those scoring above the 20th percentile regardless of the language instruction. For instance, English-instructed ELs who scored ≤20th percentile on the BRE demonstrated an overall mean increase of 99.8 points on the BRE over time, relative to a mean increase of 111.6 points for those scoring above the 20th percentile. Third, the overall W-score gap between achievement groups was wider at the end of Grade 2 across programs of language instruction (37.4 points on the BRE; 59.6 points on the BRS) than at the beginning of kindergarten (25.6 points on the BRE; 31.5 points on the BRS). Fourth, although the overall mean performance on the BRE and BRS was stronger in the language in which the ELs were instructed, this performance difference decreased over time. Compared to Spanish-instructed ELs, English-instructed ELs demonstrated a 27-point W-score advantage on the BRE at the beginning of kindergarten, but only a 4-point advantage at the end of Grade 2, whereas compared to English-instructed ELs, Spanish-instructed ELs demonstrated a 48-point W-score advantage on the BRS at the beginning of kindergarten, but only a 19-point advantage at the end of Grade 2.

Narrative Oral Language.

Conditional GCMs were estimated to model the growth of narrative oral language skills.

English LSA Measures.—Table 3.3 outlines the best fitting, conditional GCMs for MLUw, NDW, and WPM in English, which yielded a number of similar results in comparison to one another. First, the three narrative LSA measures exhibited curvilinear (cubic) growth over time. Second, the final conditional cubic models with random intercepts demonstrated the highest overall proportional variance reduction of within-person residual variance (pseudo-R_ε^2, ranging from 42% to 59% improvement), and of between-person residual intercept variance (pseudo-R_0^2, ranging from 7% to 13% improvement), as well as the lowest goodness-of-fit deviance statistics (−2 LL) and the smallest BICs. Third, the fixed effects for each LSA measure in English indicated that ELs who were instructed in Spanish

and scored above the 20th percentile on the BRE at the end of Grade 2, demonstrated a positive and significant instantaneous linear growth rate (γ_{10}). Fourth, there was a negative and significant difference in the mean intercept for ELs who scored ≤20th percentile on the BRE at the end of Grade 2 (γ_{01}), relative to their peers who scored above the 20th percentile. Fifth, the variance components indicated that there were significant within-individual differences (σ_ε^2) in the English LSA measures over time that remained unaccounted for by the models, and between-individual differences in the intercept (σ_0^2) after controlling for the language of instruction and whether or not a student scored ≤20th percentile on the BRE at the end of Grade 2.

Table 3.3 also outlines outcomes that were distinct for MLUw, NDW, and WPM in English. The final conditional cubic models for each LSA measure indicated that ELs who were instructed in Spanish and scored above the 20th percentile on the BRE, demonstrated a mean intercept at the end of Grade 2 of $\gamma_{00} = 8.1$, $p < .001$ for MLUw; $\gamma_{00} = 100.6$, $p < .001$ for NDW; and $\gamma_{00} = 91.9$, $p < .001$ for WPM in English. In contrast to reading, which showed decelerating growth, the quadratic and cubic growth parameters for MLUw and NDW in English were positive, indicating accelerating growth over time. However, similar to reading in English, growth parameters for WPM in English were negative, indicating that WPM demonstrated decelerating growth over time

The remaining results that were distinct for the English LSA measures concerned the impact of being instructed in English. For MLUw in English, English-instructed ELs experienced a negative and significant difference in their expected intercept at the end of Grade 2 ($\gamma_{02} = -0.25$, $p < .001$). In addition, their instantaneous growth rate was also slightly below that of ELs instructed in Spanish ($\gamma_{12} = -0.02$, $p < .001$), yielding a linear growth rate of 0.20 for English-instructed ELs as compared to 0.22 for Spanish-instructed ELs. For NDW in English, although English-instructed ELs experienced a positive and significant difference in their expected intercept ($\gamma_{02} = 5.4$, $p < .001$), their linear growth rate was significantly lower ($\gamma_{12} = -0.26$, $p<.001$, yielding a growth rate of 3.74 for English-instructed ELs as compared to 4 for Spanish-instructed ELs. For WPM in English, English-instructed ELs experienced a positive and significant difference in their expected intercept ($\gamma_{02} = 10.1$, $p < .001$), and their linear growth over time was not statistically different from that of Spanish-instructed ELs.

Growth Trajectories of English LSA Measures.—Figure 3.2 illustrates the growth curve trajectories of MLUw, NDW, and WPM in English as a function of language of academic instruction, and scoring either above, or ≤20th percentile on the BRE at the end of Grade 2. As before, this cross-classification resulted in four unique trajectories per LSA measure based on achievement and the language of instruction. The wave-by-wave estimates resulting from the final models of the English LSA measures are specified in Table A1.

The growth trajectories for the English LSA measures indicated similarities in comparison to one another. First, the expected growth of ELs on the English LSA measures was curvilinear, indicating positive overall growth. Second, although ELs who scored ≤20th percentile on the BRE demonstrated parallel overall positive growth over time as compared to ELs who scored above the 20th percentile on the BRE within each program of language

instruction, they demonstrated a consistent gap in their LSA measures in English. Specifically, ELs who scored ≤20th percentile on the BRE demonstrated a 0.57 gap on MLUw, a 16.6 gap on NDW, and a 12.9 gap on WPM in English from the beginning of kindergarten through the end of Grade 2. Third, Spanish-instructed ELs demonstrated more overall growth on MLUw (2.6 increase) and NDW (58.3 increase) in English over time as compared to English-instructed ELs (2.1 MLUw increase; 50.2 NDW increase), but the same overall growth on WPM in English (an increase of 34.3 for both groups). Fourth, although English-instructed ELs demonstrated higher mean NDW and WPM in English from the beginning of kindergarten to the end of Grade 2, Spanish-instructed ELs demonstrated higher mean MLUw in English from the spring of Grade 1 to the end of Grade 2.

Spanish LSA Measures.—Table 3.4 outlines the best fitting, conditional GCMs for MLUw, NDW, and WPM in Spanish, which yielded a number of similar results in comparison to one another. First, the three narrative LSA measures exhibited curvilinear (cubic) growth over time that was accelerating. Second, the final conditional cubic models with random intercepts demonstrated the highest overall proportional variance reduction of within-person residual variance (pseudo-R_{ε}^2, ranging from 26% to 48% improvement), and of between-person residual intercept variance (pseudo-R_0^2, ranging from 12% to 20% improvement), as well as the lowest goodness-of-fit deviance statistics (−2 LL) and the smallest BICs. Third, the fixed effects for each LSA measure in Spanish indicated that ELs who were instructed in Spanish and scored above the 20th percentile on the BRS at the end of Grade 2 demonstrated a positive and significant instantaneous linear growth rate (γ_{10}), and an expected rate of positive and significant acceleration in the linear slope (γ_{20}) and in the quadratic slope (γ_{30}) over time. This was similar to what was observed for growth in Spanish reading, which was also accelerating over time. Fourth, there was a negative and significant difference in the mean intercept for ELs who scored ≤20th percentile on the BRS at the end of Grade 2 (γ_{01}), relative to their peers who scored above the 20th percentile. Fifth, English-instructed ELs experienced a negative and significant difference in their expected intercept (γ_{02}) at the end of Grade 2. Sixth, the variance components indicated that there were significant within-individual differences (σ_{ε}^2) in the Spanish LSA measures over time that remained unaccounted for by the models, and between-individual differences on the intercept (σ_0^2) after controlling for language of instruction and scoring ≤20th percentile on the BRS.

Table 3.4 also outlines outcomes that were distinct for MLUw, NDW, and WPM in Spanish. The final conditional cubic models for each LSA measure indicated that ELs who were instructed in Spanish and scored above the 20th percentile on the BRS demonstrated a mean intercept at the end of Grade 2 of $\gamma_{00} = 7.2$, $p < .001$ for MLUw; $\gamma_{00} = 96.1$, $p < .001$ for NDW; and $\gamma_{00} = 84.8$, $p < .001$ for WPM in Spanish. For WpM in Spanish, in addition to a significant negative difference in the mean intercept at the end of Grade 2 ($\gamma_{01} = -10.6$, $p<.001$), ELs who scored ≤20th percentile on the BRS also showed lower linear growth rates ($\gamma_{11} = -0.21$, $p < .001$) relative to their peers who scored above the 20th percentile on the BRS. Thus, the linear slope for WPM in Spanish for ELs scoring ≤20th percentile on the BRS was 3.09 (i.e., $\gamma_{10} + \gamma_{11}$), as compared to 3.3 for ELs scoring above the 20th percentile

on the BRS. For MLUw and NDW in Spanish, the linear growth rates were not different for the two groups.

The remaining differences for the Spanish LSA measures concerned the impact of being instructed in English. For MLUw in Spanish, the instantaneous growth rate for English-instructed ELs was slightly below that of ELs instructed in Spanish ($\gamma_{12} = -0.01$, $p < .001$), yielding a linear growth rate of 0.24 for English-instructed ELs as compared to 0.25 for Spanish-instructed ELs. For NDW in Spanish, the instantaneous growth rate for English-instructed ELs was slightly below that of ELs instructed in Spanish ($\gamma_{12} = -0.19$, $p < .001$), yielding a linear growth rate of 3.11 for English-instructed ELs as compared to 3.3 for Spanish-instructed ELs. For WPM in Spanish, the linear growth rate of English-instructed ELs was not different from the linear growth rate of Spanish-instructed ELs.

Growth Trajectories of Spanish LSA Measures.—Figure 3.3 illustrates the growth curve trajectories of MLUw, NDW, and WPM in Spanish as a function of the four-group classification based on language of instruction and achievement in Spanish at the end of Grade 2. The wave-by-wave estimates resulting from the final models of the Spanish LSA measures are specified in Table A2.

The growth trajectories for the Spanish LSA measures indicated similarities in comparison to one another. First, the expected growth of ELs on the Spanish LSA measures was curvilinear, indicating positive overall growth with a period of slight diminished growth during Grade 1. Specifically, English-instructed ELs demonstrated a period of diminished growth from the fall to the spring of Grade 1, on mean MLUw (−0.05) and mean NDW (−1) in Spanish. In addition, ELs in both language of instruction groups who scored ≤20th percentile on the BRS demonstrated a period of diminished growth in Spanish WPM from the fall to the spring of Grade 1. Second, although growth in MLUw and NDW in Spanish did not differ between high and low achieving ELs based on the BRS, those scoring ≤20th percentile on BRS had an expected MLUw that was 0.43 shorter and NDW that 12.7 words lower than their high achieving peers from the beginning of kindergarten through the end of Grade 2. Third, Spanish-instructed ELs demonstrated more overall growth on MLUw (2.5 increase) and NDW(40.9 increase) in Spanish over time as compared to English-instructed ELs (2.1 MLUw increase; 35.2 NDW increase). Fourth, the difference in WPM in Spanish between high and low achieving groups was wider at the end of Grade 2 across programs of language instruction (10.6 lower WPM in Spanish) than at the beginning of kindergarten (4.1 lower WPM in Spanish) due to the difference in growth rates between the two groups that yielded lower overall growth (growth of 22.7 WPM for ELs who scored < 20th percentile on BRS as compared to growth of 29.2 WPM for ELs who scored above the 20th percentile on the BRS.

Discussion

This longitudinal study aimed to determine whether Spanish-speaking ELs who demonstrated low reading achievement at the end of Grade 2 also demonstrated differential development from the beginning of kindergarten (first research aim), and to characterize their growth in narrative oral language skills over the same time period (second research

aim). Both research aims also evaluated the potential moderating influence of language of instruction. A series of GCMs were estimated to address the two primary research aims.

Differential Development of Reading Achievement.

The first research aim concerned whether Spanish-speaking ELs who demonstrated low reading achievement at the end of Grade 2, in different programs of language instruction, also demonstrated differential development from the beginning of kindergarten. It was hypothesized that ELs who finished Grade 2 with low reading achievement would demonstrate differential development from the beginning of kindergarten characterized by difficulties over time with reading skills, relative to their EL peers who demonstrate grade-appropriate reading skills. Put another way, the first research aim sought to provide a systematic description of growth for ELs who end up scoring below the 20th percentile at the end of Grade 2 on BRE and BRS across programs of language instruction, relative to their peers who end up scoring above the 20th percentile.

The study found that children differed in their development from the beginning of kindergarten, showing that ELs who ended Grade 2 below the 20th percentile in English or Spanish reading demonstrated difficulties with early reading skills beginning in kindergarten across program types, with the overall impact over time being less negative on the BRE relative to the BRS. The differential development was characterized by difficulties over time such that the lag of ELs with low reading achievement is smallest at the beginning of kindergarten and increases with each additional semester in either language (see Figure 3.1 and Tables A1 and A2). These findings are important, as they provide evidence from a large-scale, longitudinal sample that the reading achievement difficulties evidenced by some Spanish-speaking ELs at the end of Grade 2 in English and Spanish can be detected as early as the first semester in Grade 1 by using standardized reading skill measures such as the BRE and BRS from the WLPB-R. The implications of this differential development are clear; given that the gap in reading achievement is smallest at the beginning of kindergarten and largest at the end of Grade 2, it is imperative to provide additional support for reading instruction as early as possible for ELs who demonstrate early reading difficulties in either language. These findings are in line with prior work (Mancilla-Martinez & Lesaux, 2011; Nakamoto et al., 2007), which has shown that the academic achievement gap between EL students and their non-EL peers widens around Grade 3, particularly in reading comprehension.

The findings with regard to language of instruction indicated that ELs demonstrated stronger overall reading achievement in the language in which they are instructed from the beginning of kindergarten to the end of Grade 2, which is not surprising. However, the findings also indicated that this performance difference gradually decreased, with Spanish-instructed ELs narrowing the performance difference between languages over time to a greater extent than English-instructed ELs. Put differently, the difference in performance between instructional groups is both larger at the outset and remains larger in Spanish as compared to English. These findings are consistent with concerns raised by bilingual education advocates that ignoring L1 in literacy instruction creates poorer outcomes in L1, whereas focusing on L1 in literacy instruction can lead to comparable, if not superior, literacy outcomes in L2.

Although Spanish instructed students did not exhibit superior performance in L2 by the end of Grade 2 in comparison to English instructed students, the differences between groups in L2 reading decreased over time. By the end of Grade 2, Spanish-instructed ELs are expected to both (a) largely close the gap in English reading achievement, and (b) continue to demonstrate an advantage in Spanish reading achievement relative to English-instructed ELs. In sum, reading achievement in both languages demonstrated overall positive growth for Spanish-speaking ELs regardless of the language of instruction, with Spanish-instructed ELs demonstrating an overall advantage in their bilingual reading achievement over time relative to English-instructed ELs.

Growth of Narrative Oral Language and Reading Skills.

The second research aim concerned characterization of the growth of narrative oral language skills for Spanish-speaking ELs who demonstrated low reading achievement in different programs of language instruction. It was hypothesized that ELs who finished Grade 2 with low reading achievement would also demonstrate low oral language skills beginning in kindergarten across programs of language instruction, relative to their EL peers with grade-appropriate reading skills.

English Oral Language Skills and Reading Achievement.—The hypothesis regarding the negative impact of finishing Grade 2 with low reading achievement in English was supported by the findings from this study, which indicated that these ELs demonstrated lower, oral language skills in English from the beginning of kindergarten across program types. Specifically, ELs who scored ≤20th percentile on the BRE showed consistently inferior performance in English oral language skills, but comparable growth, to ELs who scored above the 20th percentile on the BRE within each program of language instruction. That is, students low in reading at the end of Grade 2 demonstrated a consistent gap in their oral language measures in English from the beginning of kindergarten through the end of Grade 2. This consistent gap in language performance implies that children do not, on average, catch up in their oral morphosyntactic, vocabulary, and verbal fluency skills in English, relative to children who end up demonstrating grade-appropriate English reading achievement at the end of Grade 2 (see Figure 3.2 and Table A1). This finding provides what may be the first longitudinal evidence that difficulties in English reading achievement experienced by ELs at the end of Grade 2 can be detected as early as the first semester in kindergarten by using narrative LSA measures such as MLUw, NDW, and WPM in English. The implications of these longitudinal relations are clear; narrative measures of oral language development in English as early as the start of kindergarten can serve as early warning indicators of reading difficulties for Spanish-speaking ELs who are at risk for low reading achievement in English prior to entering Grade 3.

Turning to language of instruction, we found that English-instructed ELs demonstrated stronger overall English oral vocabulary and verbal fluency skills in English, whereas Spanish-instructed ELs demonstrated more overall growth in their oral morphosyntactic and vocabulary skills in English. Notably, Spanish-instructed ELs began to outpace their English-instructed peers in their mean growth of oral morphosyntactic skills in English beginning in the spring of Grade 1. In other words, the early advantage in English MLUw

for English-instructed ELs diminished over time and evolved into an advantage for Spanish-instructed ELs. This shift ultimately stems from the difference in intercept and linear growth rates for English MLUw that favors Spanish-instructed students and results in a 0.25 advantage in MLUw in English at the end of Grade 2. In sum, students demonstrated overall positive growth in English oral language under both language of instruction models, with Spanish-instructed ELs demonstrating more overall growth in oral morphosyntactic and vocabulary skills compared to their English-instructed peers.

Spanish Oral Language Skills and Reading Achievement.—Students reading below the 20th percentile in Spanish at the end of Grade 2 were also found to have lower oral language skills in Spanish from the beginning of kindergarten across program types. Specifically, although growth in oral morphosyntactic and vocabulary skills was comparable for both groups of students, those scoring below the 20th percentile on BRS demonstrated a consistent gap in these two oral language skills in Spanish. In addition, the gap in oral verbal fluency skills in Spanish between these groups gradually widened over time. In short, ELs who demonstrate low Spanish reading achievement were not found to catch up in specific oral language skills (morphosyntax and vocabulary), and in fact fell further behind in their verbal fluency skills in Spanish (see Figure 3.3 and Table A2). These longitudinal findings imply that difficulties in Spanish reading achievement in Grade 2 can be detected as early as the first semester in kindergarten using narrative LSA measures such as MLUw, NDW, and WPM in Spanish, suggesting that Spanish measures of oral language could serve as early indicators of risk for low reading achievement in Spanish and could be used as early as the beginning of kindergarten.

Turning to language of instruction, Spanish-instructed ELs demonstrated more overall growth in oral morphosyntactic and vocabulary skills in Spanish compared to English-instructed ELs. Further, English-instructed ELs demonstrated a period of slight diminished growth in their Spanish oral morphosyntactic and vocabulary skills during Grade 1 in contrast to Spanish-instructed ELs, whose growth in these skills remained positive throughout the entire time frame. This period of slow growth in skills is transient in so far as students demonstrated overall positive growth in both programs of instruction, with Spanish-instructed ELs demonstrating more overall growth in their oral Spanish morphosyntactic and vocabulary skills compared to their English-instructed peers.

The findings of this study differ with Nakamoto et al. (2012), which longitudinally examined the oral language and reading skills of Spanish-speaking ELs across different programs of language instruction from kindergarten to Grade 3. Nakamoto et al. found that although Spanish-instructed ELs demonstrated significantly higher scores than English-instructed ELs in language and reading measures in Spanish, they demonstrated significantly lower scores in language and reading measures in English from kindergarten to Grade 3. It is possible that this study's findings differed due to including a participant sample that was more than twice the size of Nakamoto et al. (1,243 relative to 502 Spanish-speaking ELs) and from a variety of states rather than ELs from only one location in south Texas. In addition, this study used functional measures of oral language development (gross morphosyntax, vocabulary diversity; verbal fluency) via narrative language sampling in the fall and spring semesters of

each academic year rather than standardized measures of picture naming administered once per year.

Limitations and Future Directions.

This study used a large-scale, longitudinal dataset to address gaps in the knowledge base on the development of reading and language in ELs who end up below the 20th percentile in reading at the end of Grade 2 in either English or Spanish, and to examine the possible role of language of instruction on developmental trajectories in those domains (Branum-Martin, Foorman, Francis, & Mehta, 2010; Miller et al, 2006). The study has several limitations that can be addressed through future research. While this study examined the growth in reading and oral language skills in Spanish-speaking ELs, it did not examine development among speakers of other languages. There are over 400 language minority groups in the United States, with L1 instruction available for some language groups in some districts. Longitudinal research on other language minority groups is sorely needed, particularly children from Arabic-, Chinese-, or Vietnamese-language minority homes in the United States (National Center for Education Statistics, 2015), but also research on language minority populations in other countries, in part because these groups are understudied, but also because it is unclear how generalizable the current study's findings are to other linguistic groups, and to other cultural contexts.

Another limitation of this study is that it did not account for language exposure and experience present before kindergarten, and did not follow EL students past Grade 2. Language of acquisition history during the preschool years or earlier, provides important context for the reading and oral language skills that were identified by this study during the first semester of kindergarten. Future work can attempt to account for language exposure and experience before school entry at kindergarten, and could also continue to longitudinally track the reading and oral language skills of ELs across programs of language instruction through to the end of elementary school.

A third limitation, alluded to above, concerns the generalizability of our findings to children from other states in the United States, but also to non-U.S. and non-English speaking contexts. While the present study focused on students in the two states in the United States with the largest populations of Spanish-speaking ELs, the EL populations of these states are predominantly of Mexican heritage. Future work is needed that focuses on speakers of other dialects of Spanish such as Caribbean (mostly concentrated in Florida and various states in the Northeast United States) and Central American Spanish (mostly concentrated in Miami, FL, Washington, DC, and New York). Although distinct dialects in Spanish are generally mutually intelligible, there are phonological, lexical, cultural, and other variations across dialects and among Spanish speakers across the United States (Goldstein & Iglesias, 2017) that may uniquely the development of reading and language skills and place children at risk of poor reading outcomes in English and/or Spanish.

Summary and Implications.

This study investigated reading and language development in English and Spanish among Spanish-speaking EL students. We began by classifying students based on their English and

Spanish reading performance at the end of Grade 2 before looking back in time at children's reading and language development and the possible contribution of language of instruction to children's development. Using individual growth models resulted in four major findings.

The first major finding was that ELs who presented with low reading achievement at the end of Grade 2, across programs of language instruction, demonstrated differential development that was characterized by difficulties with early reading skills beginning in kindergarten. These reading difficulties increased over time in both languages, and were more pronounced in Spanish reading. The second major finding was that, although students demonstrated higher initial levels of reading achievement at the beginning of kindergarten in the language in which they were instructed, these differences decreased over time, but more so for children in Spanish instruction. By the end of Grade 2, Spanish-instructed students showed a minimal gap in English reading achievement and a continued advantage in Spanish reading achievement, relative to that of English-instructed students. The third major finding was that ELs with low reading achievement demonstrated lower initial levels of oral language skills in each language from the beginning of kindergarten through the end of Grade 2; the difference between reading groups was consistent over time, was present in English and in Spanish, and was observed for both English and Spanish instructed students. The fourth major finding was that although ELs demonstrated higher initial levels across a range of bilingual oral language skills at the beginning of kindergarten in the language in which they were instructed, these differences by language of instruction varied over time uniquely in English and Spanish. The initial advantage in English oral language skills demonstrated by English-instructed ELs was maintained over time for NDW and WPM, but decreased for MLUw, shifting to an advantage for Spanish-instructed ELs by the end of Grade 2. In contrast, the initial advantage in Spanish oral language skills demonstrated by Spanish-instructed ELs, was maintained over time for MLUw, NDW, and wPm.

The findings from this study help to more precisely characterize the longitudinal relations between the bilingual reading and oral language skills of Spanish-speaking ELs during the early school years. We contrasted the developmental trajectories of reading and language skills for children who will be found to be low in reading achievement at the end of Grade 2 with those of children who will be found to be on-track, and described the effects of language of instruction on these differences. Arguably, some of the most important implications of this study deal with informing the processes of early identification and intervention for Spanish-speaking ELs who are likely to demonstrate reading achievement difficulties prior to entering the third grade, which is precisely when the academic achievement gap of ELs begins to significantly widen (Nakamoto et al., 2007). Specifically, this study provides evidence that can help to guide the approaches that practitioners and researchers use to identify ELs who may be at risk for developing reading achievement difficulties, as early as the first semester in kindergarten, by using standardized reading measures (BRE and BRS from the WLPB-R), and LSA measures of functional oral language skills (MLUw, NDW, and WPM) from narrative retell samples in each language. Similarly, the findings from this study can be used to also inform strategies for providing early intervention to Spanish-speaking ELs in kindergarten whose later reading achievement and outcomes may benefit from developing their gross morphosyntactic and lexical skills, as

well as their overall verbal fluency within the structured context of producing narratives in each language.

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Appendix

Table A1.

Wave-by-Wave Estimates From the Final Growth Curve Model Parameter Estimates for Broad Reading Cluster W-Scores in English (BRE), Mean Length of Utterances in Words (MLUw), Number of Different Words (NDW), and Words per Minute (WPM) in English

Variable	K-Fall	K-Spring	1st-Fall	1st-Spring	2nd-Fall	2nd-Spring
BRE						
20% BRE Si	316.69	361.10	386.87	414.61	428.47	439.54
BRE Si	342.28	389.37	417.04	447.46	463.23	476.98
20% BRE Ei	343.72	382.92	404.96	427.49	437.63	443.49
BRE Ei	369.31	411.19	435.14	460.34	472.39	480.93
MLUw						
20% BRE Si	4.88	5.77	6.01	6.19	6.48	7.49
BRE Si	5.45	6.34	6.58	6.77	7.05	8.06
20% BRE Ei	5.12	5.90	6.06	6.13	6.34	7.23
BRE Ei	5.70	6.47	6.63	6.71	6.91	7.81
NDW						
20% BRE Si	25.73	44.55	51.17	57.61	64.49	84.02
BRE Si	42.32	61.14	67.76	74.20	81.08	100.61
20% BRE Ei	39.25	56.23	61.54	66.14	71.70	89.40
BRE Ei	55.84	72.82	78.13	82.73	88.30	105.99
WPM						
20% BRE Si	44.67	49.80	55.58	64.98	71.58	79.02
BRE Ei	57.58	62.70	68.48	77.88	84.48	91.92
20% BRE Ei	54.78	59.90	65.68	75.08	81.68	89.12
BRE Ei	67.68	72.81	78.58	87.98	94.58	102.02

Note. K = kindergarten; 1st = Grade 1; 2nd = Grade 2; 20% = scoring at or below the 20th percentile at the end of Grade 2 on the broad reading cluster in English (BRE) of the Woodcock Language Proficiency Battery-Revised, W-score (Woodcock, 1991); Si = Spanish-instructed; Ei = English-instructed.

Table A2.

Wave-by-Wave Estimates From the Final Growth Curve Model Parameter Estimates for Broad Reading Cluster W-Scores in English (BRS), Mean Length of Utterances in Words (MLUw), Number of Different Words (NDW), and Words per Minute (WPM) in Spanish

Variable	K-Fall	K-Spring	1st-Fall	1st-Spring	2nd-Fall	2nd-Spring
BRS						
20% BRS Si	274.49	375.05	413.14	434.62	437.05	437.74
BRS Si	305.97	412.87	455.49	483.32	490.28	497.31
20% BRS Ei	226.20	333.35	376.15	404.22	411.35	418.63
BRS Ei	257.67	371.16	418.50	452.91	464.58	478.21
MLUw						
20% BRS Si	4.28	5.23	5.39	5.43	5.65	6.75
BRS Si	4.71	5.65	5.82	5.85	6.07	7.18
20% BRS Ei	4.32	5.18	5.29	5.24	5.40	6.42
BRS Ei	4.74	5.61	5.71	5.66	5.82	6.85
NDW						
20% BRS Si	42.42	63.48	67.91	68.20	69.90	83.34
BRS Si	55.12	76.18	80.61	80.90	82.61	96.05
20% BRS Ei	40.66	60.43	63.93	62.93	63.71	75.86
BRS Ei	53.37	73.13	76.64	75.63	76.42	88.56
WPM						
20% BRS Si	51.55	59.84	60.18	59.08	61.13	74.21
BRS Si	55.61	65.37	66.77	67.15	70.26	84.82
20% BRS Ei	46.06	54.34	54.69	53.58	55.64	68.72
BRS Ei	50.11	59.88	61.28	61.66	64.77	79.33

Note. K = kindergarten; 1st = Grade 1; 2nd = Grade 2; 20% = scoring at or below the 20th percentile at the end of Grade 2 on the broad reading cluster in Spanish (BRS) of the Woodcock Language Proficiency Battery-Revised, W-score (Woodcock & Muñoz-Sandoval, 1995); Si = Spanish- instructed; Ei = English-instructed.

Biography

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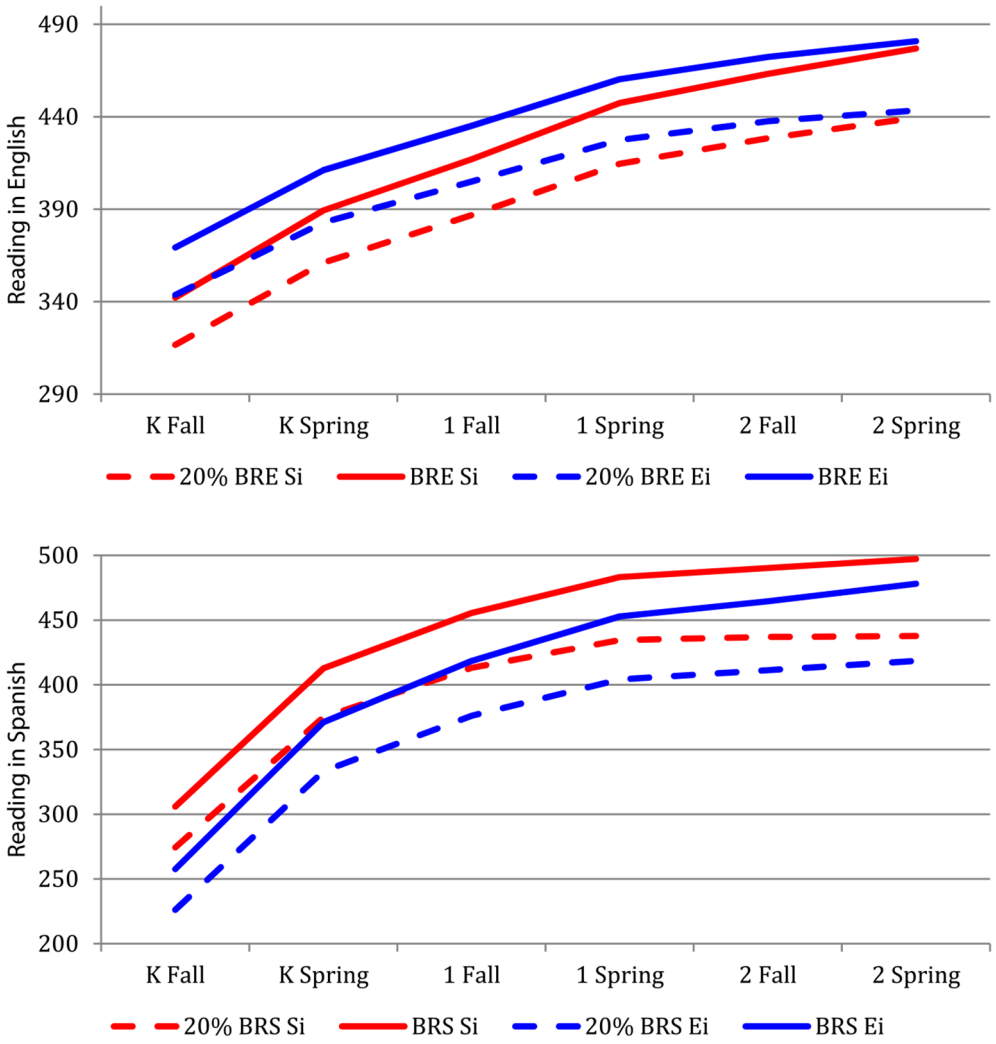

Figure 3.1.

Growth curve trajectories of W-scores on the broad reading cluster in English (BRE) and Spanish (BRS) of the Woodcock Language Proficiency Battery-Revised (Woodcock, 1991; Woodcock & Muñoz-Sandoval, 1995), as a function of being instructed in either Spanish (Si) or English (Ei), and scoring either above or at or below the 20th percentile (20%) on the BRE, BRS at the end of Grade 2.

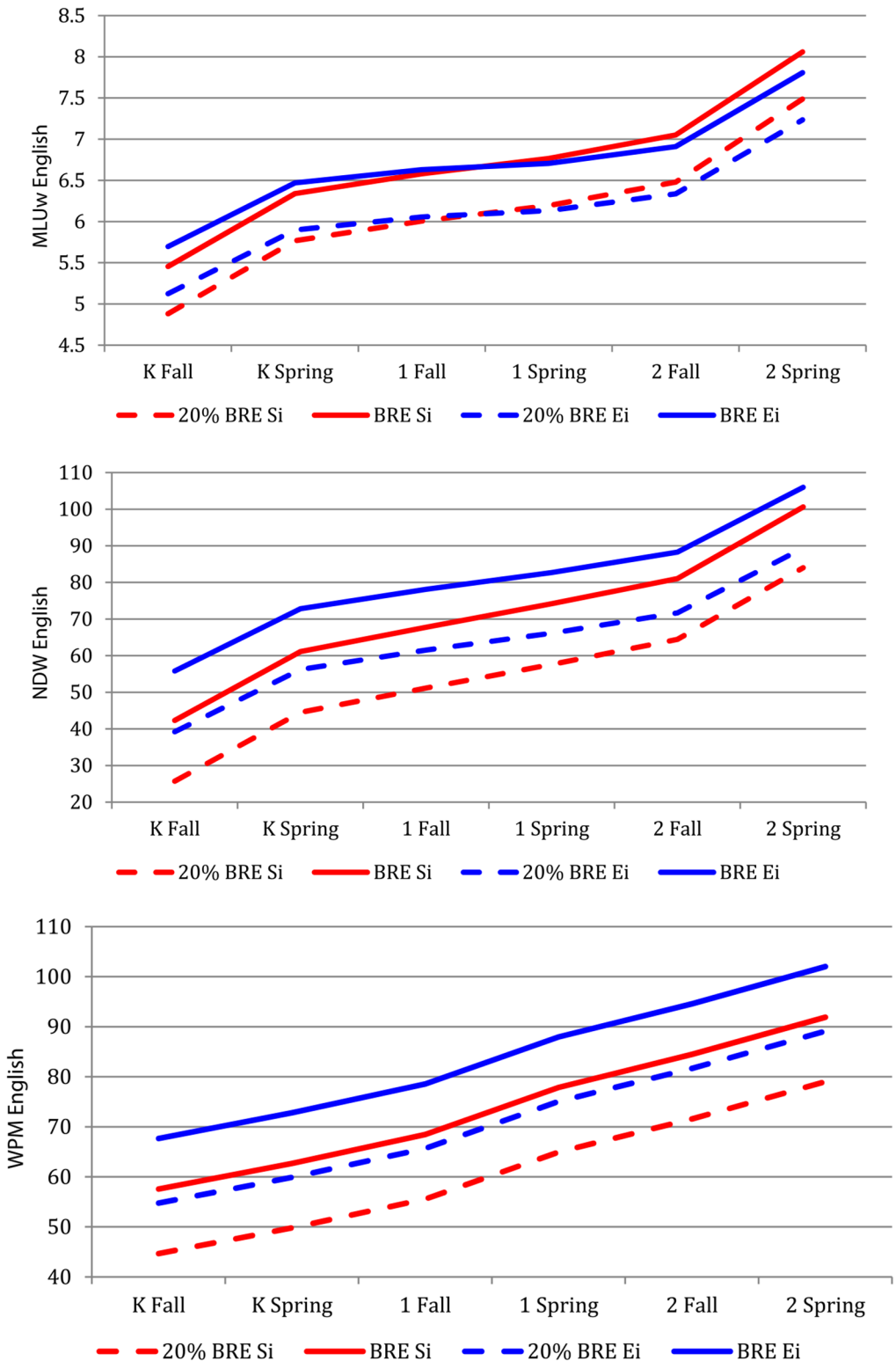

Figure 3.2.

Growth curve trajectories of mean length of utterances in words (MLUw), number of different words (NDW), and words per minute (WPM) in English, as a function of being

instructed in either Spanish (Si) or English (Ei), and scoring either above or at or below the 20th percentile (20%) at the end of Grade 2 on the broad reading cluster in English (BRE) of the Woodcock Language Proficiency Battery-Revised, W-score (Woodcock, 1991).

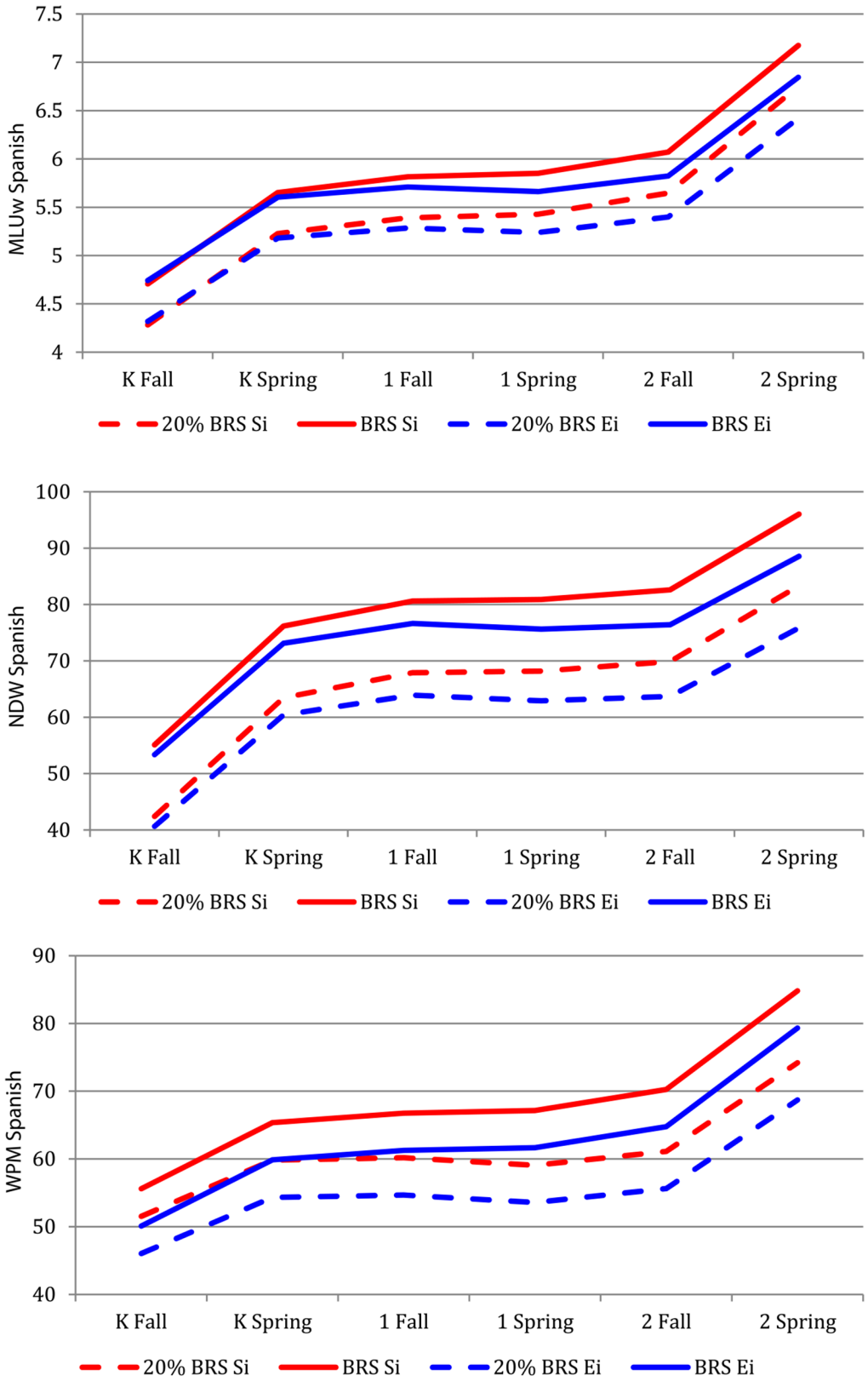

Figure 3.3.

Growth curve trajectories of mean length of utterances in words (MLUw), number of different words (NDW), and words per minute (WPM) in Spanish, as a function of being instructed either in Spanish (Si) or English (Ei), and scoring either above or at or below the 20th percentile (20%) at the end of Grade 2 on the broad reading cluster in Spanish (BRS) of the Woodcock Language Proficiency Battery-Revised, W-score (Woodcock & Muñoz-Sandoval, 1995).

Table 3.1.

Participant, Reading, and Language Sample Descriptive Statistics

	K-Fall	K-Spring	1st-Fall	lst-Spring	2nd-Fall	2nd-Spring
Participants	685	732	954	975	1,205	1,233
Boys; Girls	332; 353	353; 379	475; 479	489; 486	605; 600	620; 613
Instructed: E; Instructed: S	222; 463	229; 503	289; 665	299; 676	384; 821	392; 841
WLPB-R_w: Total observations	0	0	1,816	1,930	2,355	2,447
$N_{English}$; $N_{Spanish}$	0; 0	0; 0	904; 912	975; 955	1,193; 1,162	1,232; 1,215
WLPB-R_w: BRE			419.9 (27.2)	447.6 (26.7)	460.7 (21.6)	472.7 (20.3)
Percent at risk–BRE			11.3%	12.8%	14.8%	15.1%
WLPB-R_w: BRS			437.6 (42.9)	466.1 (38.8)	472.4 (34.3)	478.8 (35.2)
Percent at risk–BRS			16.8%	17.3%	19%	20.7%
LSA: Total samples	996	1,187	1,649	1,782	2,227	2,326
$N_{English}$; $N_{Spanish}$	402; 594	547; 640	786; 863	879; 903	1,118; 1,109	1,181; 1,145
MLUw: E	5.6 (1.2)	6.6 (1.2)	6.3 (1.1)	7 (1)	6.8 (0.8)	7.9 (1.1)
NDW: E	55 (22.2)	67.5 (23.9)	74 (27.5)	75.4 (23.1)	82.2 (22.4)	100.3 (23.2)
WPM: E	68.5 (24.1)	70.9 (25.3)	74.4 (25.5)	79.3 (23.3)	88.1 (24)	93.4 (22.7)
MLUw: S	4.7 (0.9)	5.7 (1)	5.6 (0.8)	6 (0.9)	5.8 (0.9)	7 (1.1)
NDW: S	54.5 (19.6)	71.6 (20.2)	80.8 (23.1)	75.9 (19.1)	79.3 (18.5)	91.6 (19.8)
WPM: S	55.9 (20.4)	63.4 (21)	65.8 (20.5)	65.3 (19.7)	66.7 (20.6)	81.5 (21.6)

Note. K = kindergarten; 1st = Grade 1; 2nd = Grade 2; E = English; S = Spanish; WLPB-R_W = Woodcock Language Proficiency Battery-Revised, W-score (Woodcock, 1991; Woodcock & Muñoz-Sandoval, 1995); $N_{English}$ = total number of observations/samples in English; $N_{Spanish}$ = total number of observations/samples in Spanish; BRE = broad reading cluster in English; Percent at risk–BRE: Percentage of students with W-score performance at or below the 20th percentile at the end (spring semester) of Grade 2 in the BRE; BRS = broad reading cluster in Spanish; Percent at risk–BRS: Percentage of students with W-score performance at or below the 20th percentile at the end (spring semester) of Grade 2 in the BRS; LSA = language sample analysis; MLUw = mean length of utterance in words; NDW = number of different words; WPM = words per minute; standard deviations appear in parentheses.

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Table 3.2.

Final growth curve model parameter estimates for Broad Reading Cluster W-scores in English (BRE) and Spanish (BRS)

Parameter	UG-BRE	CG-BRE	UG-BRS	CG-BRS
Fixed Effects: γ (SE)				
Intercept [γ_{00}]	472.6[b] (0.7)	477[b] (0.7)	478.8[b] (1.1)	497.3[b] (0.8)
Linear slope [γ_{10}]	0.97[b] (0.08)	1.3[b] (0.08)	1.7[b] (0.3)	1.6[b] (0.3)
Quadratic slope [γ_{20}]	−0.1[b] (0.004)	−0.1[b] (0.004)	0.15[a] (0.05)	0.15[a] (0.05)
Cubic slope [γ_{30}]			0.01[b] (0.002)	0.01[b] (0.002)
20% $BR_{@Grade\ 2}$ [γ_{01}]		−37.4[b] (1.5)		−59.6[b] (1.8)
English instruction (Ei) [γ_{02}]		4[b] (1.1)		−19.1[b] (1.5)
20% BR × linear slope [γ_{11}]		−0.38[b] (0.08)		−0.91[b] (0.11)
Ei × linear slope [γ_{12}]		−0.75[b] (0.06)		0.94[b] (0.09)
Variance Components: σ (SE)				
Within-person variance [σ_ε^2]	132[b] (3.4)	124.7[b] (3.2)	238[b] (6.1)	229.9[b] (5.9)
B/w-person intercept σ_0^2]	438[b] (19.3)	246.5[b] (11.5)	1223.3[b] (52.9)	336[b] (16.6)
Proportional Variance Reduction				
Within-person variance [R_ε^2]	79%	80%	59%	61%
B/w-person intercept [R_0^2]		44%		73%
Goodness-of-Fit				
−2LL	36,312.2[b]	35,499.6[b]	38,802.4[b]	37,288.3[b]
BIC	36,354	35,574.9	38,852.5	37,371.8

Note. The proportional variance reduction of within-person variance [R^{e2}] for the best fitting unconditional and conditional growth curve models was calculated based on the within-person variance of the unconditional means model (not shown) for each measure. UG = best fitting unconditional growth curve model; CG=best fitting conditional growth curve model;BRE=broad reading cluster in English (BRE); and BRS = broad reading cluster in Spanish of the Woodcock Language Proficiency Battery-Revised (Woodcock, 1991; Woodcock & Muñoz-Sandoval, 1995); 20% $BR_{@Grade\ 2}$ = W-score performance at the 20th percentile at the end (spring semester) of Grade 2 in the broad reading cluster; −2LL = −2 log-likelihood deviance statistic; BIC = Schwarz' Bayesian information criterion.

[a] $p < .01$.

[b] $p < .001$.

Table 3.3.

Final Growth Curve Model Parameter Estimates for Mean Length of Utterances in Words (MLUw), Number of Different Words (NDW), and Words per Minute (WPM) in English

Parameter	UG-MLUw	CG-MLUw	UG-NDW	CG-NDW	UG-WPM	CG-WPM
Fixed Effects: γ (SE)						
Intercept [γ_{00}]	7.9^{b} (0.03)	8.1^{b} (0.04)	100^{b} (0.7)	100.6^{b} (0.8)	93.4^{b} (0.7)	91.9^{b} (0.8)
Linear slope [γ_{10}]	0.21^{b} (0.009)	0.22^{b} (0.009)	3.9^{b} (0.1)	4^{b} (0.1)	0.83^{b} (0.1)	0.83^{b} (0.1)
Quadratic slope [γ_{20}]	0.01^{b} (0.0007)	0.01^{b} (0.0007)	0.2^{b} (0.01)	0.2^{b} (0.01)	−0.04^{a} (0.01)	−0.04^{a} (0.01)
Cubic slope [γ_{30}]	0.0003^{b} (0.00002)	0.0003^{b} (0.00002)	0.004^{b} (0.0003)	0.004^{b} (0.0003)	−0.001^{b} (0.0003)	−0.001^{b} (0.0003)
20% BRE$_{@Grade\ 2}$ [γ_{01}]		−0.57^{b} (0.06)		−16.6^{a} (1.7)		−12.9^{b} (1.7)
English instruction (Ei) [γ_{02}]		−0.25^{b} (0.06)		5.4^{b} (1.3)		10.1^{b} (1.2)
Ei × linear slope [γ_{12}]		−0.02^{b} (0.003)		−0.26^{b} (0.05)		
Variance Components: σ (SE)						
Within-person variance [σ_{ε}^2]	0.8^{b} (0.02)	0.79^{b} (0.02)	211.9^{b} (4)	209.2^{b} (4.9)	215.2^{b} (5)	214.8^{b} (5)
B/w-person intercept [σ_0^2]	0.35^{b} (0.02)	0.33^{b} (0.02)	391^{b} (18.8)	341.2^{b} (16.7)	392.3^{b} (18.9)	344.1^{b} (16.8)
Proportional Variance Reduction						
Within-person variance [R_{ε}^2]	42%	42%	58%	59%	42%	42%
B/w-person intercept R_0^2		7%		13%		12%
Goodness-of-Fit						
−2LL	14,060.2^{b}	13,951.3^{b}	42,763.3^{b}	42,573.4^{b}	42,827.5^{b}	42,683.4^{b}
BIC	14,111.2	14,027.8	42,814.3	42,650	42,878.5	42,751.4

Note. The proportional variance reduction of within-person variance [R_{ε}^2] for the best fitting unconditional and conditional growth curve models was calculated based on the within-person variance of the unconditional means model (not shown) for each measure. UG = best fitting unconditional growth curve model; CG = best fitting conditional growth curve model; 20% BRE$_{@Grade\ 2}$ = W-score performance at or below the 20th percentile at the end (spring semester) of Grade 2 in the broad reading cluster in English (BRE) of the Woodcock Language Proficiency Battery-Revised, W-score (Woodcock, 1991); −2LL = −2 log-likelihood deviance statistic; BIC = Schwarz' Bayesian information criterion.

$^{a}p < .01$.

$^{b}p < .001$.

Table 3.4.

Final Growth Curve Model Parameter Estimates for Mean Length of Utterances in Words (MLUw), Number of Different Words (NDW), and Words per Minute (WPM) in Spanish

Parameter	UG-MLUw	CG-MLUw	UG-NDW	CG-NDW	UG-WPM	CG-WPM
Fixed Effects: γ (SE)						
Intercept [γ_{00}]	7[b] (0.03)	7.2[b] (0.03)	91.3[b] (0.6)	96.1[b] (0.6)	81.1[b] (0.6)	84.8[b] (0.6)
Linear slope [γ_{10}]	0.25[b] (0.007)	0.25[b] (0.007)	3.2[b] (0.1)	3.3[b] (0.1)	3.2[b] (0.2)	3.3[b] (0.2)
Quadratic slope [γ_{20}]	0.02[b] (0.0006)	0.02[b] (0.0006)	0.24[b] (0.01)	0.24[b] (0.01)	0.2[b] (0.01)	0.2[b] (0.01)
Cubic slope [γ_{30}]	0.0003[b] (0.00001)	0.0003[b] (0.00001)	0.006[b] (0.0003)	0.006[b] (0.0003)	0.004[b] (0.0003)	0.004[b] (0.0003)
20% $BRS_{@Grade\ 2}$ [γ_{01}]		−0.42[b] (0.06)		−12.7[a] (1.3)		−10.6[b] (1.5)
English instruction (Ei) [γ_{02}]		−0.33[b] (0.05)		−7.5[b] (1.1)		−5.5[b] (1)
20% BRS × linear slope [γ_{11}]						−0.21[a] (0.07)
Ei × linear slope [γ_{12}]		−0.01[b] (0.002)		−0.19[b] (0.05)		
Variance Components: σ (SE)						
Within-person variance [σ_e^2]	0.61[b] (0.01)	0.6[b] (0.01)	221.4[b] (5)	220.1[b] (4.9)	254.8[b] (5.7)	254.2[b] (5.7)
B/w-person intercept [σ_e^2]	0.31[b] (0.02)	0.27[b] (0.02)	192.9[b] (10.7)	153.6[b] (8.8)	184.8[b] (10.7)	161.9[b] (9.6)
Proportional Variance Reduction						
Within-person variance [R_e^2]	47%	48%	38%	39%	26%	26%
B/w-person intercept R_0^2		13%		20%		12%
Goodness-of-Fit						
−2LL	13,661.2[b]	13,511.6[b]	45,096.3[b]	44,867[b]	45,670.9[b]	45,568.9[b]
BIC	13,712.6	13,588.7	45,147.7	44,944.1	45,722.3	45,586.1

Note. The proportional variance reduction of within-person variance [R_e^2] for the best fitting unconditional and conditional growth curve models was calculated based on the within-person variance of the unconditional means model (not shown) for each measure. UG = best fitting unconditional growth curve model; CG = best fitting conditional growth curve model; 20% $BRS_{@Grade\ 2}$ = W-score performance at or below the 20th percentile at the end (spring semester) of Grade 2 in the broad reading cluster in Spanish (BRS) of the Woodcock Language Proficiency Battery-Revised, W-score (Woodcock & Muñoz-Sandoval, 1995); −2LL = −2 log-likelihood deviance statistic; BIC = Schwarz' Bayesian information criterion.

[a] $p < .01$.

$^{b}p < .001$.