The association of the home literacy environment and parental reading beliefs with oral language growth trajectories of Spanish-English bilingual children

Gloria Yeomans-Maldonado*, Carol Mesa, LARRC

Children's Learning Institute at University of Texas Health Science Center at Houston, 7000 Fannin, Houston, TX

ARTICLE INFO

ABSTRACT

Purpose: This study examines the extent to which the Home Literacy Environment (HLE) as measured by reading habits and resources, library use, and subscriptions or materials, as well as parental reading beliefs predict both language skills (i.e., vocabulary) at kindergarten and students' trajectories of growth from kindergarten (K) to grade 3 (G3).

Method: The sample included 259 Spanish-English bilingual children and their parents living in Arizona. We measured HLE and parental reading beliefs with a questionnaire administered to parents during the kindergarten year. Children completed measures of English and bilingual Spanish-English vocabulary in grades K to G3.

Results: Findings indicated that library use and reading habits and resources predicted skills at kindergarten, but not growth. Across all language outcomes, library use was the consistent factor associated with skills in kindergarten.

Conclusion: Given that HLE was associated with variability in children's vocabulary skills at kindergarten but not with vocabulary growth, this suggests that timely HLE supports are essential. Supports around library use show promise, given their significant associations with vocabulary skills in Spanish-English bilingual children.

© 2021 Elsevier Inc. All rights reserved.

1. Introduction

Between 2000 and 2017, the percent of Hispanic school-aged children increased from 16% to 26%, making this group the largest and fastest growing subpopulation in the U.S. (de Brey et al., 2019). During the same period, the number of K-12 English language learners (ELLs) who speak Spanish at home has remained fairly constant, from 77% in 2010 to 75% in 2017 (National Center for Education Statistics, 2019). Typically, Spanish-English bilingual children come from homes in which Spanish, the first language (L1), is primarily spoken. In these homes, English, the second language (L2), is learned via diverse interactions with family members (e.g., siblings), the community, or at school (Buysse, Peisner-Feinberg, Páez, Hammer & Knowles, 2014). Thus, the amount of exposure to and use of L1 and L2 significantly differs among bilingual children, which has implications for their level of proficiency across languages (Hammer, Lawrence & Miccio, 2008). Evidence shows that strong language and literacy skills in the L1 are associated with strong oral language, word reading, and fluency skills in the L2 (e.g., LARRC et al., 2021; Proctor, August, Carlo & Snow, 2006; Solari et al., 2014).

Several factors and experiences at school and home shape bilingual children's language skills across both languages. For instance, related to school, limited access to education that promotes and builds upon children's bilingual skills and cultural background is often detrimental to their language and academic achievement (Castro & Prishker, 2019). Evidence indicates that when schools meet the needs of bilingual children, these children exhibit equivalent or superior academic progress compared to their monolingual peers (e.g., Kieffer & Thompson, 2018; Steele et al., 2017) and peers in English immersion programs (Valentino & Reardon, 2015). Related to home, which is the focus of the present study, we know that factors such as poverty (e.g., Wight, Chau & Thampi, 2011), low parental education (e.g., Hoff & Core, 2013), and limited exposure to literacy practices and materials during preschool years can impact bilingual children's oral language skills unfavorably (e.g., Hammer, Miccio & Wagstaff, 2003) and place them at risk for poor academic achievement (Kieffer & Vukovic, 2012). In addition, we also know that when families engage in a variety of practices (e.g., shared book reading) that support language

* Corresponding author:
E-mail address: Gloria.Yeomans@uth.tmc.edu (G. Yeomans-Maldonado).

and literacy at home (Kibler, Paulick, Palacios & HillFirst, 2020; Sawyer, Cycyk, Sandilos & Hammer, 2018), their children exhibit stronger vocabulary skills regardless of the family socioeconomic status (Gonzalez et al., 2017; Kibler et al., 2020; Sawyer et al., 2018; Sénéchal & LeFevre, 2002).

Despite the progress in language and academic achievement observed in recent years (Kieffer & Thompson, 2018; Steele et al., 2017), many Spanish-English bilingual children start school with low oral language skills that negatively affect their reading and future academic achievement (e.g., Kieffer & Vukovic, 2012). Among potential factors that shape bilingual children's early oral language development is the set of parental reading beliefs, literacy practices, and language and literacy materials (e.g., children's books, alphabet games) that children encounter at home and that have shown positive associations with children's oral language (Gonzalez et al., 2017; Sénéchal & LeFevre, 2002) and literacy skills such as letter and print knowledge (Sénéchal, LeFevre, Thomas & Daley, 1998). Thus, understanding how these home literacy factors promote Spanish-English bilingual children's language skills is essential for practitioners and policymakers to offer early support, especially for those children who may be at risk for impoverished language and reading skills at school entry.

In this study, we examine the role that HLE and parental reading beliefs of Spanish-English bilingual children play in the growth trajectories of oral language skills that are fundamental to reading comprehension. We focus on how HLE and parental reading beliefs predict English receptive and expressive vocabulary and bilingual expressive vocabulary in kindergarten because these language skills are not only critical to Spanish-English bilingual children's reading comprehension (e.g., Proctor et al., 2006; Proctor, Carlo, August & Snow, 2005), but are also at the core of their reading difficulties (e.g., Kieffer & Vukovic, 2012). We also utilize a growth modeling approach, in which we examine the associations of HLE and parental reading beliefs in kindergarten with growth in children's oral language from kindergarten to third grade.

1.1. Oral language foundation is important for reading comprehension

Reading comprehension is critical to academic success in both monolingual and bilingual populations (e.g., Farstrup & Samuels, 2002). Once word reading becomes effortless, oral language skills, such as vocabulary and grammar, are essential for developing reading comprehension. These oral language skills enable readers to understand words and sentences and to engage in comprehension processes, such as inference making, to build a mental model of the text (Perfetti, Landi & Oakhill, 2005). Oral language skills acquired by kindergarten are significant and independent contributors to later reading comprehension (e.g., Catts, Herrera, Nielsen & Bridges, 2015). Indeed, the association between oral language, especially vocabulary, and reading comprehension is well-established (e.g., Ouellette, 2006; Verhoeven & Leeuwe, 2008). For example, in a longitudinal study that followed 2000 Dutch children throughout elementary school, Verhoeven and Leeuwe (2008) found that receptive vocabulary significantly predicted both concurrent reading comprehension at first grade and growth across subsequent grades, indicating its critical role in predicting reading comprehension. Further, interventions that target word knowledge lead to direct learning of target words and indirect improvement in reading comprehension (see Elleman, Lindo, Morphy & Compton, 2009 for a review). Broadly speaking, a rich home literacy environment could be thought of as an early intervention for children, given that early vocabulary learning occurs at home (Snow, Barnes, Chandler, Goodman & Hemphill, 1991). In this study, we focus on how the home literacy environment of Latino Spanish-speaking children is associated with their oral language skills growth trajectories.

1.2. Understanding the influence of the home literacy environment and parental reading on children's skills

The HLE is usually conceptualized as the quality and type of child-parent interactions, practices, and materials related to language and literacy that children experience at home (e.g., Burgess, 2011). The HLE is a multidimensional construct strongly related to socio-demographic factors such as family socioeconomic status (SES) and parents' beliefs about language and literacy (Burgess, 2011; Leseman & Jong, 1998). One of the most studied practices of the HLE is shared book reading, which parents use at home to engage children in conversations and support their literacy development (van Kleeck, Stahl & Bauer, 2003). Often, this practice is recognized as one of the most valuable experiences, with strong and lasting effects, that promotes oral language (Huebner & Payne, 2010; Raikes et al., 2006) and literacy development (e.g., Justice, Weber, Ezell, & Bakeman, 2002) in children from diverse backgrounds (e.g., Mesa & Restrepo, 2019; Raikes et al., 2006). For example, a meta-analysis by Mol, Bus, de Jong and Smeets (2008) found that parent-child shared book reading has a moderate positive effect on children's vocabulary, particularly when the child's oral participation is actively promoted. Consistent with this finding, Shahaeian et al. (2018) found that early shared book reading promotes children's vocabulary and future reading achievement.

Similar to shared book reading, parents' modeling of literacy use (e.g., parent leisure reading) can not only shape their children's language development but also influence children's attitudes toward literacy. Burgess et al. (2002), for instance, found that the number of books parents read per month was significantly correlated with children's oral language and phonological awareness. In addition to shared book reading and parent reading habits, children with access to a wide number of books may be exposed to an extensive variety of text and rich language, which in turn influences language development (Dickinson, Griffith, Golinkoff & Hirsh-Pasek, 2012). Children's access to books, defined as number of books at home, has been found to be associated with oral language (Payne, Whitehurst & Angell, 1994; Sénéchal & LeFevre, 2014). Related to access to books, library use represents a literacy activity that families engage in, offering additional access to print materials and a setting that facilitates and encourages adult-child interactions (Johnson, 2012; Saracho, 1999). Frequency of library use has been associated with higher language and literacy skills (Whitehead, 2004).

Parental beliefs around literacy and reading may also be an important contributor to the HLE. Research by DeBaryshe & Binder (1994) suggests that parental reading beliefs are associated with the frequency with which parents expose their children to shared book reading as well as the quality of these interactions. In addition, Weigel, Martin and Bennett (2006) found that parental reading beliefs were concurrently associated with preschoolers' emergent writing and receptive language, and indirectly associated with print knowledge and reading interest through parent-child activities.

In summary, from prior research, we know that aspects of HLE such as shared book reading, resources at home, library use, and parental beliefs are all associated with children's language and literacy skills. However, this prior research has been conducted with samples of mostly monolingual English-speaking children and their families (cf. Sénéchal & LeFevre, 2014). The home experiences of culturally and linguistically diverse families may differ from those of monolingual families (Castro, Mendez, Garcia & Westerberg, 2012; Perry, Mitchell & Brown, 2008). Given the focus on monolingual families in most previous studies, further research is needed to understand how the HLE and parental reading beliefs relate to the language skills of bilingual and language minority children.

1.3. HLE and parental reading beliefs of Spanish-English bilingual children

Values and beliefs about language and literacy are not the same across cultures and families. This diversity is reflected in the language and literacy practices that happen at home (van Kleeck et al., 2003). Evidence involving Spanish-speaking families indicates that families play a critical role in providing opportunities to support their children's language and literacy development (Bitteti & Hammer, 2016; Caspe, 2009; Farver, Xu, Eppe & Lonigan, 2006, 2013; Hammer, Nimmo, Cohen, Draheim & Johnson, 2005; Hoff & Core, 2013). Latino families continue to be overrepresented among the population in poverty (U.S. Census, 2017), which may in turn influence the number of literacy resources available at home. Parenting stress, struggles to earn sufficient income, and limited time and literacy resources are all factors that influence the home language and literacy practices of Latino families (Salinas, Perez-Granados, Feldman & Huffman, 2017). Despite the socioeconomic barriers that limit Latino families' access to books and other literacy resources, there is evidence indicating that Latino families place value on literacy (Castro et al., 2012; Reese, Thompson & Goldenberg, 2008), even if their literacy practices do not look the same as those of other cultural groups (Perry et al., 2008). For instance, unlike mainstream families, many Latino families view reading to children as an opportunity for transmitting values and moral behavior, rather than a way to instruct them in reading skills (e.g., Reese & Gallimore, 2000).

Similar to the evidence from monolingual English samples, shared book reading has been associated with Spanish-speaking children's vocabulary. For example, in a sample of 3-year old Spanish-speaking children and their Latino mothers, Boyce et al. (2004) found that maternal book shared reading behaviors and use of literacy strategies (e.g., elaborating on children's ideas, asking the child to recall information from story) were significant predictors of children's conceptual vocabulary. Parent literacy habits have also been associated with young Latino children's receptive vocabulary in the language in which they were the most fluent (Farver et al., 2006). There is also evidence that parental reading beliefs are associated with children's language skills. For example, using a sample of Mexican American mothers and their preschool children, Gonzalez et al. (2017) suggested that parental reading beliefs were mediators of family-level characteristics (i.e., mother's education and family income) and children's English receptive vocabulary.

Based on prior studies with Spanish-English bilingual children and their families, we know that the number of books and resources in the home, as well as library use, are associated with language and literacy outcomes. A study by Trainin, Wessels, Nelson and Vadasy (2017) found that book availability, as measured by library use and the number of books at home, was strongly correlated with English language skills of bilingual kindergarten children (e.g., emergent literacy skills and vocabulary). Further, using a sample of Spanish-English bilingual preschoolers, Gonzalez and Uhing (2008) found that library use significantly predicted English oral language proficiency, whereas extended family interactions (e.g., "Our children spend time with their grandparents") accounted for the greatest amount of variance in Spanish oral language proficiency. Findings from these studies indicate that access to books at home or at the library is associated with higher language and literacy abilities in children. Nevertheless, the variability in the way that library use may affect English and Spanish language outcomes deserves further examination, especially when involving Spanish-English bilingual children.

In summary, the HLE and parental reading beliefs play a key role in predicting bilinguals' English and Spanish early literacy skills (Farver et al., 2006; Gonzalez & Uhing, 2008), although

its longer-term contribution to English vocabulary (i.e., receptive and expressive) and bilingual vocabulary remains unclear. Consequently, there is a need to better understand the characteristics of Spanish-English bilingual children's home environment that are associated with vocabulary skills at school entry and the subsequent growth of these skills. Further, the studies described thus far have been primarily based on cross-sectional data. Although valuable, cross-sectional studies limit our understanding of the associations between HLE and how children develop skills across time. The present study contributes to the research around the HLE and parental reading beliefs of Latino families and Spanish-English bilingual children by examining their associations with children's oral language *trajectories* using a longitudinal design.

1.4. Home literacy predictors of children's early language and literacy trajectories

Most of what we know about HLE, both with monolingual and bilingual children, stems from studies that have looked at concurrent associations of HLE with children's language and literacy skills or studies that have examined how associations of HLE with children's skills change across two or more time points (e.g., Burgess et al., 2002; Sénéchal & LeFevre, 2002; 2014). Although these studies have allowed us to build a robust understanding of the direction and magnitude of these associations, they cannot speak to how HLE is related to children's early language and literacy *growth* trajectories. Below, we summarize the findings of the few studies that have examined HLE and its association with children's language and literacy growth trajectories.

One common thread among studies that have used HLE to examine growth is that HLE has been found to explain variation in the intercept of children's growth trajectories but not on how fast their skills grow. For example, in a sample of 192 Korean children, Kim (2009) found that HLE as measured by home reading (e.g., number of children's books, frequency of reading to child, frequency of family reading) and parent teaching (e.g., teaching home language and helping with homework) was associated with early literacy skills at the end of the study, when children were about 5.5 years old, but not with children's growth. This study used four time points during the preschool and kindergarten year. Specifically, home reading positively predicted variation at the end of the study for phonological awareness, letter-name knowledge, receptive vocabulary, word reading, and pseudoword reading. Parent teaching was negatively associated with children's skills at the end of the study for phonological awareness, receptive vocabulary, word reading, and pseudoword reading.

In another study, conducted with a sample of 1,425 monolingual Spanish-speaking children living in Chile, Mendive, Lara, Aldoney, Pérez and Pezoa (2020) categorized families into four HLE groups based on the different language and literacy practices that parents implemented. This study included three time points: beginning and end of pre-K and end of kindergarten. Results from their study suggested that group membership did not predict vocabulary growth. Examining narrative skills, Bitetti and Hammer (2016) found that the frequency with which low-income Puerto Rican mothers read to their Spanish-English bilingual children had a positive influence on children's growth of narrative language but not on measures of mean of length of utterance (MLU) or the number of different words. This study measured children at 8 time points: the fall and spring of Head Start (2 years), and the fall and spring of kindergarten to first grade. Children whose mothers reported reading to them at least once a week showed a better understanding of story grammar, characters' emotions, and cohesive devices than children whose mothers reported reading less regularly.

Despite existing evidence, there is a dearth of studies focusing on the home literacy practices of Latino families living in the U.S. and using a longitudinal approach to examine associations between HLE and the growth trajectories of children's vocabulary skills. Further, to our knowledge there have not been any studies examining associations between parental reading beliefs and the trajectories of children's language skills. Given the fundamental role of vocabulary skills in reading comprehension, understanding the link between HLE and parental reading beliefs during the kindergarten year and subsequent growth is important for mitigating long-term risk of reading comprehension difficulties (Proctor et al., 2006).

1.5. Conceptualizing HLE and parental reading beliefs in the present study

Given the multifaceted nature of the HLE, studies have used diverse measures to capture the characteristics of the HLE, ranging from direct observations of parent-child interactions (e.g., Boyce et al., 2004; Linberg, Lehrl, & Weinert, 2020) to questionnaires, checklists, or surveys about interactions, practices, and materials at home (e.g., Caspe, 2009; Farver et al., 2006). One prominent tool is the Home Literacy Environment Questionnaire (HLEQ; Griffin & Morrison, 1997), used to capture book reading at home, access to print materials, and frequency of library visits. In observational studies involving primarily English-speaking families, results suggest that HLE as measured by this tool predicts children's language outcomes. For instance, Griffin and Morrison (1997) found that HLEQ scores predicted about 10% of the variance in vocabulary knowledge in a sample of English-speaking children followed from kindergarten to second grade. For the current study, we are using the HLEQ as part of our conceptualization of HLE.

Besides HLEQ, several studies have employed the Parent Reading Belief Inventory (PRBI) to capture parental beliefs, values, and attitudes that influence the reading practices happening at home (Skibbe, Justice, Zucker & McGinty, 2008; Weigel et al., 2006), including with samples of Latino families (Gonzalez et al., 2017; Rodríguez, Hammer & Lawrence, 2009). Notably, when using the PRBI, some studies have used different subscales from the measure (Yeo, Ong & Ng, 2014), while others have conceptualized parents' beliefs using the total score (Gonzalez et al., 2017; Weigel et al., 2006). In the current study, we conceptualize HLE by using both the HLEQ and the positive affect and resources subscales from the PRBI. Together, these measures capture both parent practices and beliefs about language and literacy at home.

1.6. Current study

Few studies have examined the association of HLE and parental reading beliefs with the growth trajectories of Spanish-English bilingual children's oral language skills (cf. Bitetti & Hammer 2016). In this study, we examined the role of the HLE (defined as reading habits and resources, library use, subscriptions or materials) and parent reading beliefs in predicting language growth in a subsample of young Spanish-English bilingual children. Our goal was not to examine the Latino families' HLE and parental reading beliefs from a perspective of evaluating adequacy or inadequacy. Rather, we examined whether these aspects of Latinos families' home environments as captured by existing instruments (i.e., HLEQ and PRBI) predict children's vocabulary skills in kindergarten, as well as the growth of these skills from kindergarten to third grade. We focused on examining English vocabulary (i.e. receptive and expressive) and Spanish-English bilingual expressive vocabulary, given the role of these skills in predicting reading comprehension (e.g., Proctor et al., 2005; 2006).

Importantly, there are a few distinctive features associated with this study. First, rather than focusing on early literacy, we examined language skills that predict reading comprehension (i.e., vocabulary). Second, we examined the role that the HLE and parental reading beliefs play in predicting children's language skills longitudinally. Third, building upon existing evidence and given that Spanish-English bilingual children should be evaluated in both languages to capture their skills to the fullest (Mancilla-Martinez, Greenfader & Ochoa, 2018), we included not only English but also a bilingual measure of vocabulary. This study examines the role of Latino families' HLE, and thus it adds to the understanding of the literacy practices of one of the largest subpopulations in the U.S. (U.S. Census, 2019). Two questions guided this study:

a) Do the HLE and parental reading beliefs as measured in kindergarten predict English receptive and expressive vocabulary and Spanish-English bilingual expressive vocabulary at kindergarten (K) while controlling for child and family characteristics?
b) Do the HLE and parental reading beliefs as measured in kindergarten predict English receptive and expressive and Spanish-English bilingual expressive vocabulary growth from K to third grade while controlling for child and family characteristics?

2. Method

2.1. Participants

Participants were part of a 5-year (i.e., PreK to grade 3) longitudinal study conducted by the Language and Reading Research Consortium (LARRC). At the beginning of the study, 286 Spanish-English bilingual prekindergartners from 43 classrooms in the Phoenix metropolitan area participated. Children were enrolled in 22 Head Start and 21 public school classrooms. For children to be considered to participate in the study, the following inclusion criteria had to be met: (a) parent reported that their child spoke Spanish as their native language; (b) child had no severe disability (i.e. speech, language, cognitive, sensory or motor) that would prevent participation in assessments based on parent and teacher report; (c) child was attending preschool during the first year of the study; and (d) child was eligible to enter kindergarten for the second year of the study. The participants were recruited from the Phoenix Metropolitan area in Arizona, which has a high concentration of Latino residents. Following Institutional Review Board approval, we obtained permission to conduct the study from the school districts in the area. Principals, school staff, and parents were informed about the purpose of the study in meetings led by research staff. In the first year of the study, parents consented to their child's participation from PreK through grade 3. Enrollment and remaining in the study were voluntary.

2.1.1. Sample for the present study

At the beginning of the second year of the study (i.e., kindergarten), 15 participants left the study, 10 were retained in preschool, and two were advanced to grade 1. Thus, from the 286 Pre-K children who started in the larger study, we were left with a baseline sample of 259 children (135 girls and 124 boys) who stayed for the second year of the longitudinal study and were enrolled in kindergarten. From this baseline sample, we excluded those children who were held back ($n = 6$). Further, 10.04% of the sample left the study ($n = 26$). Given this attrition and excluding the 6 retained students, the sample size ranged from 228 to 253 students (i.e., 253 students in kindergarten, 248 in grade 1, 231 in grade 2, and 228 in grade 3).

For the outcomes modeled in our analysis, we looked at data collected between kindergarten to third grade with up to four administration points (i.e., kindergarten, grade 1, grade 2, and

grade 3). At data collection in the spring of kindergarten, children ranged in age from 63 months to 79 months ($M = 71.71$ months, $SD = 3.53$ months) and were distributed across 111 kindergarten classrooms with English as the primary or only language of instruction. Based on a family background questionnaire, children were all of Hispanic ethnicity, and most came from a Mexican-American background. Twenty-one parents (8.30%) reported that their child had an Individualized Education Program (IEP); data on this variable were missing for 13 children (5.14%).

In terms of race, 85.38% ($n = 216$) of children were White, 0.79% were American Indian or Alaska native ($n = 2$), and 13.83% ($n = 35$) did not report race. Median family annual income was $15,001-$20,000. About 92% ($n = 232$) of the children were on free and reduced lunch (missing data for 13 children or 5.40% of participants). About 41% of the caregivers in the study ($n = 103$) had completed 8 or fewer years of schooling, 23.32% ($n = 59$) had some high school but no diploma, 14.62% ($n = 37$) completed high school or a GED, 6.32% ($n = 16$) completed high school plus technical training, and 10.68% ($n = 27$) completed some college or higher. Data were missing for 11 participants (4.35%).

Fifty-five percent of the children spoke Spanish all the time or almost all of the time at home ($n = 139$), 21% spoke Spanish and English about the same amount of time at home ($n = 52$), 9.49% spoke Spanish less than half of the time ($n = 24$), and 9.49% spoke English most of the time ($n = 24$). Data on this variable were missing for 5.53% of participants ($n = 14$). In 83.34% ($n = 211$) of households, parents reported that Spanish was the language spoken most at home, whereas 5.14% ($n = 13$) of parents indicated that English was the language spoken most at home (missing data for 29 children or 11.46% of participants).

2.2. Procedures

In line with the purpose of the study, parents completed a family background questionnaire during the spring of their child's kindergarten year. This paper questionnaire was available in both Spanish and English, although parents completed the majority of the questionnaires in Spanish. Questionnaires were collected directly from parents, sent back via mail, or returned through the teacher. When needed, we reached parents by phone or email to ask them to fill out and return the questionnaire. For the family background questionnaire, which was first designed in English, the study team followed the back-translation procedure (Marín & Marín, 1991) as required by the institution's IRB.

During the spring semester of PreK through grade 3, children in the larger LARRC study were assessed using a comprehensive set of measures that included the 3 sets of vocabulary outcomes that are part of the current study. This longitudinal administration design allowed us to model growth trajectories for our outcomes of interest. Assessments were conducted at the child's school or the family's convenient location (community center or library) in rooms as quiet as possible. The assessment of the comprehensive set of measures included as part of the larger study was conducted by trained bilingual assessors and required about 5.75 hours, divided over multiple sessions, to complete. The assessment administration order was counterbalanced across participants.

2.3. Measures

First, we describe our predictors of interest, the home literacy environment, and the parental reading beliefs inventory. Next, we describe the English expressive and receptive outcomes followed by the bilingual expressive outcome. Last, we present the covariates that were included in the final models to control for demographic characteristics.

2.3.1. Home literacy environment (predictor)

The original scale includes a wide variety of items to capture characteristics of the home environment that are strong and significant predictors of children's language and literacy skills from preschool through the end of second grade (Griffin & Morrison, 1997). The present study used an adapted version of the home literacy environment developed by Griffin and Morrison (1997). Questions about digital subscriptions and digital books and easiness of access to a library were added to this study's version of the original instrument. For the current study, we dichotomized the subscriptions items since they had minimal variability. Specifically, families endorsing zero subscriptions received a 0, and those families with more than 1 subscription received a 1. Further, we combined the digital and non-digital questions since the digital questions were rarely endorsed in our sample. Supplemental material A includes a list of the 10 HLE items that were used for the present study with their respective frequencies; supplemental material B includes the item-level correlations for the 10 items. For the vast majority of parents, the questions were presented in Spanish and requested information about the frequency of parents reading to children, library affiliation and visits, and digital and print reading materials.

Cronbach's alpha, as reported in the study where these items were first used, was 0.74 (Griffin & Morrison, 1997). Internal consistency for our sample was 0.63 when using all 10 HLE items listed in Table 3. For the present analysis and as described in detail below in the analytic strategy, we used principal component analysis to reduce the number of items into 3 components: (1) Library Use, (2) Subscriptions, and (3) Reading Habits and Resources. Internal consistency of these three components as reported by ordinal alpha was: 0.75 for library use, 0.69 for subscriptions, and 0.64 for reading habits and resources.

2.3.2. Parent reading belief inventory or PRBI (predictor)

The PRBI inventory was originally designed to capture family beliefs, feelings, and resources about reading aloud to their children. The inventory consists of 55 items organized into 7 subscales scales (i.e. affect, participation, resources, efficacy, knowledge, environment, and reading instruction). Parents are expected to complete the inventory items based on a 4-point scale in Likert format (1 = Strongly disagree, 2 =Disagree, 3 = Agree, 4 = Strongly agree). As part of the larger LARRC study, only the affect and resources subscales were included in the family background questionnaire. Thus, to capture parental beliefs in the present study we included these 2 subscales that were administered to parents for a total of 15 items. The affect subscale measures the feelings associated with reading. The resources subscale measures the extent to which materials facilitate reading at home. Internal consistency as shown by Cronbach's Alpha is 0.85 and 0.79 for affect and resources respectively; test-retest reliability was 0.79 (DeBaryshe & Binder, 1994). For our sample, internal consistency was 0.82 for the affect subscale and 0.81 for the resources subscale. Supplemental material C describes the frequencies and means of all items that are part of these two subscales; supplemental material D reports the item-level correlations. Note that the Parent Reading Belief Inventory has been previously translated and administered in Spanish to Latino families (see Gonzalez, Taylor, Davis & Kim, 2013; Rodríguez et al., 2009). Although Gonzalez et al. (2013) and Rodríguez et al. (2009)) administered the complete PRBI measure, internal consistency for the resources and positive affect was reported as adequate in both studies.

2.3.3. English expressive and receptive vocabulary (outcome)

Two standardized measures Peabody Picture Vocabulary Test-Fourth Edition (PPVT-4; Dunn & Dunn, 2007) and Expressive Vocabulary Test Second Edition (EVT-2; Williams & Williams, 2007)

were employed to capture American English vocabulary. For the PPVT-4, the examiner presents the child with four pictures and the vocabulary word and asks the child to point to the picture that shows the meaning of the word. For the EVT-2, examinees are presented with a colored picture and asked by the assessor to provide a one-word response (e.g., "What is this animal?" or "Tell me another word for jacket.") These tests provide an estimate of the examinee's receptive and expressive vocabulary ability, respectively. Assessors followed standardized administration procedures (Dunn & Dunn, 2007; Williams & Williams, 2007). Test-retest reliability is 0.93 and 0.94 for PPVT and EVT respectively.

2.3.4. Spanish-English bilingual expressive vocabulary (outcome)

A standardized measure Expressive One-Word Picture Vocabulary Test– Spanish Bilingual Edition (EOWPVT-SBE; Martin & Brownell, 2010), was administered to capture expressive vocabulary in children who speak Spanish and English. During administration, the assessors ask the child to name a picture. As indicated in the manual, the measure was administered in the child's dominant language. If the child did not respond correctly, the examiner asked the child for the word in English. For our particular sample, the average percent correct in Spanish was about 59%, vs. 40% correct in English in kindergarten. For grade 1, the percent correct in Spanish was 56%, vs. 44% in English. For grade 2, the percent correct in Spanish was 48%, and the percent correct in English was about 52%. Per the manual, children receive a score for correct responses provided in Spanish or English. Internal consistency as measured by Cronbach's alpha was 0.99.

2.3.5. Covariates

All of our models included gender, age in months, household income, caregiver education, whether the child had an individualized education plan or IEP (as reported by the caregiver), and non-verbal intelligence as control variables. Household income and caregiver education were taken from a parent questionnaire, where mothers represented about 94% of respondents. Responses for household income had 18 categories and ranged from $5000 or less to $85,001 or more, with categories increasing by $5000. Original responses for caregiver education included nine categories ranging from 8th grade or less to doctorate. Since responses for the two highest categories (i.e., master's and doctorate) were sparse, we collapsed the options for bachelor's, master's, and doctorate into the same category, resulting in a total of 6 categories. As part of the larger LARRC study, a measure of non-verbal intelligence was administered during the first (i.e., preschool) and last year of the study (i.e., grade 3). For the present study, we used the non-verbal intelligence measure assessed in preschool using the Matrices subtest of the Kaufman Brief Intelligence Test – Second Edition (Kaufman & Kaufman, 2004). The matrices subtest measures the ability to solve new problems by assessing an individual's ability to perceive relationships and complete visual analogies. All items involve pictures or abstract designs rather than words. Consistent with the test manual recommendations when assessing individuals whose comprehension of spoken English is limited, we administered this assessment by presenting directions in Spanish.

2.4. Analytic strategy

2.4.1. Principal component analysis (PCA) for the home literacy environment

We used the 10 home literacy items described in supplemental material A to conduct principal component analysis, where an initial parallel analysis in SPSS v24 (Basto & Pereira, 2012) was used to determine the number of components to be extracted. Then, we ran the PCA in SAS v9.4 specifying a Promax oblique rotation to interpret the extracted components. Given the categorical nature

of the items, a Spearman correlation matrix was used for both the parallel analysis and the PCA.

2.4.2. Growth models taxonomy

Growth models were fit for three outcomes of interest: English receptive vocabulary, English expressive vocabulary, and Spanish-English bilingual expressive vocabulary. Depending on the outcome, these language outcomes were measured for a total of 3 (i.e., kindergarten to grade 2) or 4 (i.e., kindergarten to grade 3) time points. Specifically, English receptive and expressive vocabulary were administered at four time points, whereas the Spanish-English expressive vocabulary was administered at 3 time points. We used raw scores for all models.

For the growth models, we followed the modeling strategy outlined next, which is based on best-practices recommendations (O'Connell, Logan, Pentimonti & McCoach, 2013). First, we ran an unconditional growth model with a random intercept. Second, we added a random slope to assess if there was significant variation in the slope. If there was variation in the random slope, a covariance term between the random intercept and random slope was added using an unconstrained variance-covariance matrix. When estimated, this covariance term captured whether those children who came in with higher skills grew faster or slower. The covariance term was kept when significant; otherwise, the variance-covariance matrix was defined only for the intercept and slope. Third, we tested for non-linear growth by modeling quadratic growth, first as a fixed effect followed by adding a quadratic random effect. We accompanied this step with a visual inspection of the growth trajectories. Note that for the Spanish-English expressive vocabulary outcome, for which we only had three time points, we were constrained to only modeling the fixed quadratic term. Fourth, once the functional form for growth was well-defined and the random effects (intercept, slope, covariance) were specified according to their significance and model fit, we added a block of covariates (i.e., child's gender, child's age in months, IEP, household income, caregiver's education, and child's non-verbal intelligence). Fifth, we added our predictors of interest (i.e., the three HLE principal components and the parental reading beliefs) and assessed whether or not they explained any remaining variability in the intercept. Last, and when there was significant variation in the slope, we looked at whether our predictors of interest explained any variability in the slope.

A few notes are relevant across the three longitudinal outcomes we studied. First, the covariance term between intercept and slope was only significant for the Spanish-English expressive vocabulary. Second, we set the random effect of the quadratic term for the English expressive and receptive outcomes to be zero because the random effects covariance matrix was non-positive definite when this parameter was estimated. Last, the fixed quadratic term for the Spanish-English expressive vocabulary was not significant, and so we only present the linear results for this outcome.

2.4.3. Missing data

As illustrated in Table 2, which includes the summary statistics of the covariates used in all models, there were missing data for eight of the covariates: household income (6%), caregiver education (4%), IEP (5.14%), each of the three HLE subscales (17%), and the two PRBI subscales (5%). We assessed the missing mechanism of these variables using Little's MCAR test (1988) and found evidence to support that the data were missing at random; $\chi^2(26) = 32.803$, $P = 0.168$. So, to keep the number of observations consistent across all model specifications (i.e., growth models with no covariates vs. those with covariates), we used a dummy imputation approach. In the context of randomized controlled trials (RCTs), this is one of the methods recommended by What Works Clearinghouse Standards (What Works Clearinghouse Standards, 2017) for when co-

Table .1

Descriptive statistics of outcome measures and predictors used for analysis. Means are reported and standard deviations are in parenthesis

	Kindergarten (n = 253)	Grade 1 (n = 243)	Grade 2 (n = 230)	Grade 3 (n = 228)
English receptive vocabulary (PPVT-4)				
	n = 251	n = 233	n = 222	n = 225
Raw	76.81(18.98)	94.14(18.50)	110.75(19.78)	125.17(21.13)
Range raw	35–144	53–162	68–180	75–196
Standard score	85.27 (11.89)	86.70(11.26)	89.18(12.81)	90.62(14.18)
Range standard	52–128	63–144	60–148	58–157
English expressive vocabulary (EVT-2)				
	n = 253	n = 236	n = 224	n = 225
Raw	58.75(13.81)	71.67(14.08)	83.90(13.69)	94.19(13.36)
Range raw	29–98	34–115	51–130	67–151
Standard score	84.74(12.33)	82.29(11.64)	88.86(11.04)	90.25(10.86)
Range standard	55–123	54–131	62–135	71–148
Spanish-English expressive vocabulary (EOWPVT-SBE)				
	n = 248	n = 236	n = 223	–
Raw	40.81(11.47)	51.03(10.24)	61.48(10.73)	–
Range raw	1–75	29–85	10–108	–
Standard score	98.44(16.17)	102.00(14.37)	106.72(12.74)	–
Range standard	62–143	63–137	72–145	–

Note: When the assessment was not given in a grade, we indicate this with "−". PPVT-4: Peabody Picture Vocabulary Test - Fourth Edition English. EVT-2: Expressive Vocabulary Test - Second Edition English. EOWPVT: Expressive One-Word Picture Vocabulary Test - Spanish Bilingual Edition. The sample size (n's) reported for each measure correspond to the n for the raw scores, which we used for analysis.

Table 2

Descriptive statistics of covariates and predictors of interest at Kindergarten (n = 253)

	n	Mean or Median	SD	Range
Female	253	52.12%	−	0 − 100%
Age in months at K	253	71.71	3.53	63 − 79
Household income*	238	$15,001−$20,000	−	$5000 or less to $85,001 or more
Caregiver education*	242	Some high school (no diploma)	−	8th grade or less to bachelors
Child has an IEP (as reported by parent)	240	8.30%	−	0 to 100%
Non-verbal intelligence at PK				
Raw	253	13.99	3.45	0 − 28
Standard	253	97.68	11.37	54 − 143
Library Use at K (standardized)	210	−0.03	1.00	−1.91 − 1.84
Subscriptions at K (standardized)	210	−0.02	0.97	−0.87 to 4.15
Reading habits & resources at K (standardized)	210	0.01	1.00	−2.72 to 2.35
PRBI - Positive Affect at K	240	2.46	0.41	1.27–3.00
PRBI - Resources at K	240	2.57	0.48	0.66 − 3.00

Note: PRBI = Parent Reading Belief Inventory.

* Median is reported.

variates at baseline are missing. Specifically, we replaced missing data with a constant combined with the inclusion of a missing data indicator. Results from this dummy imputation approach were consistent with results using a complete-case analysis. Given how the maximum likelihood estimation treats outcome data in growth models, the sample size is consistent across the 4 model specifications (models A through D) for each outcome (i.e., 251 for English receptive vocabulary, 253 for English expressive vocabulary, and 248 for the Spanish-English expressive vocabulary).

3. Results

3.1. Descriptive statistics

Table 1 includes the descriptive statistics of all outcomes that we used for analysis, whereas Table 2 includes descriptive of the covariates and our predictors of interest (i.e., library use, reading habits and resources, subscriptions, and the positive affect and resources subscales from the Parent Reading Belief Inventory). The frequencies of the 10 home literacy environment (HLE) items used for analyses and the correlations among all HLE items are included in the supplemental materials A and B, respectively. We present analogous information for the two subscales of the PRBI in the supplemental materials C and D.

3.2. Principal component analysis (PCA)

Based on the parallel analysis conducted for the 10 items of the HLEQ questionnaire (see Table 3), we extracted three components which accounted for 51.99% of the total variance. Item loadings ranged from 0.46 to 0.83. We labeled the first component *Library Use* and it included the following items: (1) how often do you visit the library (loading = 0.70), (2) how easy it is for you to go to the library when your child wanted to go (loading = 0.74), and (3) does anyone in the home have a library card? (loading = 0.83). This component explained 24.36% of the variance. We labeled the second component *Subscriptions* and it included the following items: (1) how many newspaper subscriptions does your family have? (loading = 0.81), (2) how many grown-up magazine subscriptions does your family have? (loading = 0.46), and (3) how many children's magazine subscriptions does your family have (loading = 0.73). This component explained 14.03% of the variance. Last, we labeled the third component *Reading habits and resources*, and it included the following items: (1) how often do you read to yourself? (loading = 0.72), (2) how often does your spouse/partner read to him/herself? (loading = 0.58), (3) how often does your spouse/partner read to your child? (loading = 0.78), and (4) approximately how many books does your child have access to in the house? (loading = 0.59). This component explained 13.60%.

Table 3
Principal component analyses of home literacy environment items ($n = 259$)

Items	PCA loading
Library use (ordinal alpha = 0.75)	
Frequency of library visits	0.70
Easiness of going to library when caregiver or child wants	0.74
Access to library card by any members of household	0.83
Variance explained: 24.36%	
Subscriptions (ordinal alpha = 0.69)	
Number of newspapers subscriptions at home (digital and non-digital)	0.81
Number of grown-up magazines at home (digital and non-digital)	0.46
Number of children's magazines at home (digital and non-digital)	0.73
Variance explained: 14.03%	
Reading habits & resources (ordinal alpha = 0.64)	
Frequency of reading to yourself	0.72
Frequency spouse/partner read to him/herself	0.58
Frequency you and/or spouse/partner read to child	0.78
Number of books that child has access at home	0.59
Variance explained: 13.60%	

Note: Standardized regression coefficients from the rotated factor pattern is reported. Promax rotation was used.

3.3. Growth models

As outlined in the analytic strategy, we ran a series of growth models for the 3 vocabulary outcomes we considered. We defined time using the school grade, which we centered at kindergarten. Table 4 summarizes the results for each of the four growth models across the 3 outcomes that we considered. For each outcome, model A presents results with the final functional form and random effects based on the decisions described in the analytic strategy. Model B presents results after the covariate block was added into the model. Model C presents results of our predictors of interest explaining variation in the intercept. Finally, model D builds from model C and adds interactions of the predictors of interest with linear growth to answer the question of whether the three HLE components (i.e., library use, reading habits and resources, subscriptions) and the parental reading beliefs predict any variation in vocabulary growth.

3.3.1. Outcome 1: English receptive vocabulary

Model A indicates that the mean linear growth rate in English receptive vocabulary from kindergarten to third grade was positive and statistically significant (not shown in table), indicating that children grew about 16.43 points as they moved up one grade. The quadratic growth model provided a significantly better fit than the linear model according to the likelihood ratio test, $\chi^2(1) = 11.6$, $P < 0.001$. Therefore, we retained the quadratic term, and results are reported in model 1A. As model 1A shows, the positive linear parameter indicated a positive mean instantaneous growth rate at kindergarten of 18.37 points. Since the quadratic parameter is negative, this indicated that the growth rate diminished over time by a factor of $-0.73*(\text{grade})^2$, evidencing a decelerating growth pattern. Model 1B added the block of covariates predicting variation in the fall of kindergarten. Household income, caregiver education, and non-verbal intelligence were all positively and significantly associated with the average vocabulary in kindergarten. Compared to the variance in the intercept for model 1A, the intercept variance for model 1B decreased by about 32% when adding the covariates block. Model 1B was a better fit when compared to model 1A, $\chi^2(6) = 86.1$, $P < 0.001$. Model 1C, added our predictors of interest (i.e., library use, reading habits and resources, subscriptions, and the positive affect and resources subscales from the PRBI). Library use ($b = 2.68$, $P = 0.014$) was the only positive and significant predictor associated with English receptive vocabulary in kindergarten. Looking at the reduction in the intercept variance between models 1B and 1C, about 5.3% of the reduction in the intercept variance was explained by the HLE components and the

parental reading beliefs. Based on the deviance test, model 1C was a better fit than model 1B, $\chi^2(5) = 11.30$, $P < 0.046$. Results from model D, which added the interactions of the predictors of interest with the linear growth suggested that none of our predictors of interest significantly explained any variance in the growth trajectories. This was consistent with model fit based on the deviance test, $\chi^2(5) = 2.40$, $P = 0.79$, which favored model 1C. For model D, library use continued to significantly predict variance in the intercept ($b = 2.71$, $P < 0.016$).

3.3.2. Outcome 2: English expressive vocabulary

The mean linear growth rate in English expressive vocabulary from kindergarten to third grade was positive and statistically significant (not shown in table), indicating that children grew about 11.90 points each grade. The random variability in this linear slope was not significant in this model suggesting that growth in a students' trajectory did not exhibit significant variability. Model 2A includes a linear and quadratic parameter, along with random effects for only the intercept. This model was a better fit when compared to the model described above with only the linear trend and a random intercept (not shown in table), $\chi^2(1) = 16.6$, $P < 0.001$. Similar to the growth trajectory from outcome 1 (English receptive vocabulary), the trajectory for English expressive vocabulary was defined by a positive linear parameter suggesting a positive mean instantaneous growth rate at the fall of kindergarten. Given that the quadratic parameter was negative, this indicated that the growth rate diminished over time by a factor of $-0.74*(\text{grade})^2$, suggesting a decelerating growth pattern. Model 2B added the block of covariates, which predicted about 33% of the variation in English expressive vocabulary in kindergarten. Household income, caregiver education, and non-verbal intelligence were significant predictors of variation in the intercept. Also, model 2B was a better fit when compared to model 2A, $\chi^2(5) = 92.8$, $P < 0.001$. When adding our predictors of interest in model 2C, none of the 3 HLE components or parental reading beliefs were significantly associated with variation in the intercept. Together, these predictors reduced variance in the intercept by about 1.32%. Based on the deviance test, model 2C was not significantly better when compared to model 2B, $\chi^2(5) = 6.4$, $P = 0.269$. We did not estimate model 2D for expressive English vocabulary, where HLE and parental reading beliefs predict variation of the random slope, because we did not observe significant variation in the linear slope for this outcome.

3.3.3. Outcome 3: Bilingual expressive vocabulary

The mean linear growth rate in bilingual expressive vocabulary from kindergarten to third grade was positive and statistically sig-

Table 4
Predicting growth in vocabulary from K to Grade 3

	Outcome 1: English Receptive Vocabulary				Outcome 2: English Expressive Vocabulary				Outcome 3: Spanish-English Expressive Vocabulary			
	Model 1A	Model 1B	Model 1C	Model 1D	Model 2A	Model 2B	Model 2C	Model 2D	Model 3A	Model 3B	Model 3C	Model 3D
Fixed Effects												
Kindergarten (intercept)	76.62***	84.56***	85.70***	85.70***	58.66***	62.45***	63.06***	—	40.78***	44.09***	44.45***	44.48***
Grade linear (slope)	18.37***	12.45***	11.39***	11.41***	14.11***	11.54***	11.00***	—	10.39***	8.22***	7.83***	7.82***
Grade quadratic	−0.73***	−0.71***	−0.71**	−0.71**	−0.74***	−0.73***	−0.73***	—	—	—	—	—
Female	—	−2.83	−2.65	−2.68	—	−1.35	−1.27	—	—	−1.54	−1.64	−1.67^
Age in months	—	0.49	0.58*	0.57*	—	0.21	0.26	—	—	0.18	0.21	0.21
Household income	—	1.38***	1.30***	1.30***	—	1.16***	1.13***	—	—	0.80***	0.75***	0.75***
Caregiver education	—	1.42*	0.98	0.99	—	0.99*	0.78	—	—	0.77*	0.53	0.53
Non-verbal intelligence	—	1.80***	1.65***	1.65***	—	1.42***	1.35***	—	—	0.94***	0.84***	0.83***
Child has IEP? (as reported by caregiver)	—	−4.96	−5.23	−5.24	—	−3.90	−3.80	—	—	−3.46^	−3.71*	−3.74*
Library Use	—	—	2.68*	2.71*	—	—	1.18	—	—	—	1.43*	0.95
Subscriptions	—	—	1.06	1.20	—	—	0.84	—	—	—	0.61	1.95
Reading Habits & Resources	—	—	1.25	1.29	—	—	0.70	—	—	—	1.19*	1.53*
PRBI - Positive Affect	—	—	0.29	0.93	—	—	0.10	—	—	—	−1.82	−1.05
PRBI - Resources	—	—	−1.75	−1.57	—	—	−1.75	—	—	—	−0.50	−0.29
Library Use x Grade linear	—	—	—	−0.05	—	—	—	—	—	—	—	0.50
Subscriptions x Grade linear	—	—	—	−0.20	—	—	—	—	—	—	—	−0.34
Reading Habits & Resources x Grade linear	—	—	—	−0.06	—	—	—	—	—	—	—	−0.33
PRBI - Positive Affect x Grade linear	—	—	—	−0.99	—	—	—	—	—	—	—	−0.85
PRBI - Resources x Grade linear	—	—	—	−0.25	—	—	—	—	—	—	—	−0.19
Random Effects												
Within person	63.62***	64.04***	63.83***	63.83***	33.38***	33.16**	33.01***	—	39.64***	39.39***	39.40***	39.53***
Intercept	270.50***	183.42***	173.67***	173.83***	154.96***	103.97***	100.82***	—	81.14***	58.62***	54.14***	55.62***
Slope	14.87***	14.36***	14.61***	14.31***	0.16	0.29	0.40	—	9.80***	10.23**	10.22***	9.50**
Covariance (intercept and slope)	—	—	—	—	—	—	—	—	−10.42*	−11.60*	−11.27*	−10.59*
Goodness of fit												
Deviance	7399.2	7313.1	7301.8	7299.4	6683.6	6590.8	6584.4	—	5146.4	5061.8	5045.4	5041.8
Number of parameters	6	12	17	22	6	11	16	—	7	12	17	22

Note: For all outcomes we estimated random effects for intercept and slope; when random slopes are not reported it indicates that the variance in the random slope was not significant or that the covariance matrix was not positive definite when including the random slope. When random effects were statistically different from zero a covariance term was estimated and included in models if statistically significant. PRBI = Parent Reading Belief Inventory. We use "−" to indicate that a given parameter was not estimated.

Note that we also ran unconditional linear growth models as part of our model taxonomy. Results from those models are omitted in table and only present in text.

* $p < .05$
** $p < .01$
*** $p < .001$
^ $p < .10$.

nificant as shown in model 3A, indicating that children grew about 10.39 points each grade. There was significant variability in both the intercept and slope and so the covariance between intercept and slope was estimated as shown in model 3A. Note that model 3A (with the covariance parameter) had a significantly better fit when compared to a model that did not estimate the covariance parameter, $\chi^2(1) = 6.00$, $P < 0.001$. For bilingual expressive vocabulary, the quadratic term was estimated as a fixed-effect (results not shown in Table 4) but was not significant ($b = 0.23$, $P = 0.656$) and the deviance test favored model A which did not include the fixed quadratic term, $\chi^2(1) = 0.30$, $P = 0.583$. Thus, the functional form for the trajectory of this outcome was estimated as linear. Model 3B includes the block of covariates, which together predicted about 28% in intercept variance. Household income, caregiver education, and non-verbal intelligence were significant predictors of variation in the intercept. Model 3B was a better fit when compared to model 3A, $\chi^2(5) = 84.60$, $P < 0.001$. When adding our predictors of interest to model 3C, they explained about 8% in intercept variability. Library use ($b = 1.43$, $P < 0.013$) and the reading habits and resources component ($b = 1.19$, $P < 0.042$) were both positive and significant predictors of kindergarten bilingual expressive vocabulary skills. When adding the interactions of our predictors of interest with the linear growth trajectory (model 3D), none of the HLE components or parental reading beliefs predicted variance in the linear slope. For model 3D, the library component no longer predicted variation in the intercept, but reading habits and resources did. However, model 3D was a worse fit when compared to model 3C, $\chi^2(1) = 3.60$, $P < 0.608$ and so we are favoring the interpretation of model 3C.

3.3.4. Summary of growth models

Library use was a significant predictor of the intercept (i.e., spring of kindergarten) for English receptive vocabulary and Spanish-English expressive vocabulary. Reading habits and resources also predicted variability in the intercept for Spanish-English expressive vocabulary. We also found that for the Spanish-English expressive vocabulary outcome, the lower the skills in the spring of kindergarten, the higher the growth in this skill ($r = -0.77$). Together, these findings suggest that HLE components are important in explaining variability in children's skills at kindergarten but not on how fast children grow afterward. Although there was significant variability in the linear growth trajectory for English receptive and Spanish-English expressive vocabulary, none of the predictors of interest significantly explained any of this variability.

4. Discussion

This study examined the extent to which Spanish-English bilingual children's HLE (i.e., reading habits and resources, library use, subscriptions or materials) and parental reading beliefs as measured in kindergarten predicts children's language skills (i.e., English receptive and expressive vocabulary, and Spanish-English bilingual vocabulary) in kindergarten and the growth trajectories of these skills from kindergarten to third grade. All models controlled for demographic characteristics, IEP status, and non-verbal intelligence. Results from our longitudinal analyses indicated that reading habits and resources and library use predicted language skills in kindergarten, but not growth, suggesting that the supportive effect of the HLE may be more consequential around school entry before the role of school increases and children's independent reading develops. As we will elaborate below, our findings are partly consistent with previous studies; nevertheless, some differ in important ways. This study adds to existing evidence examining the role of the HLE in shaping young children's language skills and extends its implications to Spanish–English bilingual children from

low-income backgrounds living in the U.S. (e.g., Farver et al., 2006, 2013; Hammer et al., 2005).

Previous evidence has provided important insights on the concurrent associations between the HLE and children's language and literacy skills (e.g., Huebner & Payne, 2010; Farver et al., 2006, 2013; Justice, Weber, Ezell, & Bakeman, 2002). Nevertheless, only a handful of studies have explored whether the HLE is associated with the trajectory of vocabulary growth, especially among Spanish- English bilingual children who speak a minority language (see Bitetti & Hammer, 2016 for narrative outcomes). In general, the results of the current study suggested that across the three vocabulary outcomes examined, the HLE did not predict language growth from kindergarten to third grade. Instead, we found that the HLE predicted variability in the language skills in kindergarten (i.e., starting point). Specifically, library use explained variability in kindergarten English receptive and Spanish-English bilingual expressive vocabulary. Similarly, reading habits and resources predicted Spanish-English bilingual vocabulary at kindergarten. Consistent with recent evidence involving a large sample of Chilean preschool children (i.e., Mendive et al., 2020), findings in this study indicated that the HLE explains variability in the intercept (i.e., kindergarten in the present study, preschool in Mendive et al., 2020) but not growth. The results indicated that the HLE predicts oral language skills that bilingual children bring to school, underscoring the role of the HLE in shaping foundational skills in this population.

It is important to note the consistency between our results and those from the studies conducted by Farver et al. (2006), 2013), who found associations between the parents' literacy involvement subscale and English receptive vocabulary for Latino preschool-aged children. Although we did not measure HLE using the same home literacy environment questionnaire used in their study, the parents' literacy involvement component included a library use item, which is consistent with the findings of the present study. At the same time, the parents' literacy involvement subscale used in Farver's studies also included an item on the frequency of reading to the child, which in our study was not significantly associated with English receptive vocabulary, but showed associations with Spanish-English expressive vocabulary. It may be that parents' literacy habits are more consequential with younger children (i.e., preschool) than with older children (i.e., kindergarten). Alternatively, this may be a measurement artifact, given that the items came from two distinct instruments.

Although the amount of variance predicted by library use and reading habits and resources was relatively small for both receptive English (about 5.3%) and Spanish-English bilingual vocabulary (about 8%), findings are consistent with previous evidence. For example, Bus, van IJzendoorn and Pellegrini (1995)) reported similar magnitudes, indicating that shared book reading at home explained about 8% of the variance across a broader range of language outcomes. Similarly, Sénéchal and LeFevre (2002) found that HLE components such as storybook exposure explained about 9% of the variance in receptive language in a sample of monolingual English-speaking children. Differences in the amount of variance explained can be attributed to how HLE components were defined and captured in the samples. Unlike this study, for example, in Sénéchal and LeFevre's study, reading to children was captured by the number of children's book titles and authors that parents reported to know. Importantly, given the association between the HLE and children's language outcomes even after controlling for other explanatory variables, the current study adds to the evidence suggesting that enhancing HLE experiences before children start kindergarten might bring significant improvements in children's skills (e.g., Hammer et al., 2003; Mesa & Restrepo, 2019).

Given our significant findings related to library use, the specific type of activities happening during library use warrant further

consideration. Practices occurring when families come to libraries may be influencing Latino children's language skills. In fact, similar to Gonzalez and Uhing (2008), who found that library use was a dominant factor in predicting Latino preschoolers' English oral language, our results suggested significant associations between library use and both English receptive and Spanish-English expressive vocabulary in kindergarten. Presumably, public libraries offer resources that may favor the occurrence of literacy practices in English and Spanish. These practices could include parents reading to children while at the library, children participating in library activities that foster language skills in English and Spanish, or children self-initiating reading that is influenced by models from parents or other actors in the library (Trainin et al., 2017). Future studies should disentangle the factors around library use that may impact the language and literacy skills of Spanish-English bilingual children. Moreover, for some children, accessing the library may not be an option; thus, alternative approaches may need to be explored.

In line with existing evidence (e.g., Bitetti & Hammer, 2016), we found that reading habits and resources are associated with young Spanish-English bilingual children's language skills—specifically bilingual vocabulary in kindergarten. Several mechanisms may be responsible for this observed association. For instance, evidence suggests that reading to children provides unique opportunities to learn words through communicative engagement during reading (e.g., Mol et al., 2008; Shahaeian et al., 2018). Somewhat surprisingly, in contrast to Bitetti and Hammer (2016), who found significant associations between book reading and growth in one of their three narrative skills, we did not find any such association with oral language. One possibility for this discrepancy across narrative production measures and standardized vocabulary tasks is that standardized vocabulary measures are relative insensitive in detecting small changes in language skills. This lack of sensitivity between standardized measures and narrative production metrics has been documented in intervention work with Latino dual language learners (see Hammer & Sawyer, 2016). Further, the HLE conceptualization used in our study differed from the one used by Bitetti and Hammer (2016); we focused on library use, subscriptions, reading habits and resources, and parental beliefs, while those researchers used items that captured how often children were exposed to and produced stories (e.g., how often do you tell your child a make-believe story; how often do you read to your child; how often does your child tell you a made-up story). It is also possible that the frequency of reading is not enough to be influential for language growth. Alternatively, previous evidence indicates that quality of reading is a stronger predictor of language outcomes than reading frequency; thus a close examination of the parent-child interaction while reading warrants future examination. Given that our participants spoke primarily Spanish, it is imaginable that reading at home occurs mainly in Spanish, and we were not able to capture its effect with English measures, which highlights the need to examine the language use at home during literacy activities.

Of note is that across all of our models and different vocabulary outcomes, the positive affect and resources subscales of the PRBI inventory did not predict variation in vocabulary skills at kindergarten or variation in children's vocabulary trajectories. This lack of association contrasts with other studies that have found that PRBI is linked to reading competence (Yeo et al., 2014) and children's receptive language (Weigel et al., 2006). These studies, however, were not based on Latino families. It could be that in Latino families, parental reading beliefs are not a direct predictor of vocabulary outcomes, but instead parental beliefs play a mediator role in the context of home literacy environment, as was documented in a recent study by Gonzalez et al. (2017). Although the focus of the present study was not on the mediation of parental reading beliefs but instead on studying associations between parental beliefs,

home literacy, and vocabulary growth, it may be that the lack of association points at parental reading beliefs acting as mediators of other home literacy practices that are in turn associated with children's vocabulary.

Further, it may be that the way we measured parental reading beliefs in this sample did not appropriately capture the underlying construct with enough fidelity. Specifically, we only administered two of the seven subscales of the PRBI. Although work with Spanish-speaking families has suggested good internal consistency for the two subscales that we administered (see Gonzalez et al., 2013; Rodríguez et al., 2009), these same studies have suggested that using all the items of the PRBI as one or two components may be more suitable for Spanish-speaking samples. Last, to our knowledge, there are no other studies that have examined PRBI in the context of growth models, which makes it difficult to draw direct comparisons with prior findings. Future studies should attempt to replicate this finding using similar analytic approaches.

5. Limitations and future directions

As any other study, the present work is not without limitations. First, our sample lacks geographic diversity since most families were of Mexican origin living in one southwest state in the U.S. Second, given that we are using secondary data and the main aim of the original study was not related to the home literacy environment, we worked with an instrument that may not have completely captured the home literacy environment of Spanish-speaking Latino families. The HLEQ and the PRBI are instruments that have provided important insights on the practices of English monolingual families but may need adaptations to be able to capture the practices of Latino families. Also, the reliability of 2 of the HLEQ subscales (subscriptions and reading habits and resources) was below 0.70, which requires that results be interpreted with caution. Notably, the library use component, for which we found significant and consistent association across 2 of the 3 outcomes that were examined, had acceptable reliability.

In addition, the use of questionnaires may not be the best choice for obtaining accurate information. It is possible that parents selected responses considered more desirable or found it difficult to complete the measures. Future studies could incorporate face-to-face interviews and observational tools to promote more descriptive information about language and literacy practices at home. Together, these limitations restrict our understanding of factors that are unique to Latino families, and that have the potential to impact the HLE practices and beliefs at home and, consequently, children's language outcomes.

Although the focus of this study was not particularly on the measurement of HLE, in the process of examining the distribution and frequencies of the HLE items that we used for analysis, there were a few interesting points that are worth mentioning for researchers measuring the HLE in this population. The original HLEQ instrument looked at library use, subscriptions to newspapers and magazines, number of books at home, adults reading to the child, and adults reading to themselves. For our sample of Latino families, subscriptions had very little variability, and differentiating between digital and non-digital subscriptions was not relevant for these families (see supplemental material A). In trying to shorten questionnaires for this population in the future, we recommend that the subscription component is omitted from HLEQ questionnaire. Instead, researchers could consider adding items related to the language of books at home and the use of language for home literacy activities.

A future direction of the current study would also be to consider how the HLE of Latino families changes between kindergarten and 3rd grade. In the current study, HLE was measured as a time-invariant covariate in kindergarten because we were in-

terested in the influence of HLE as measured at the beginning of formal education. Future studies could examine HLE as a time-varying construct or study the trajectories of HLE in Latino families using approaches similar to those used by Rodríguez and Tamis-LeMonda (2011).

6. Conclusion

In conclusion, we found a statistically significant association between library use and young children's vocabulary at kindergarten. Understanding the role that Latino families' home literacy environment and reading beliefs play in predicting language skills allows us not only to characterize the environmental experiences that contribute to Latino children's language development but also to identify the family practices and resources that teachers and clinicians should support. Inviting families to read and facilitating book and library access are actions that professionals can promote to benefit children's vocabulary.

Author note

This paper was prepared by a Task Force of the Language and Reading Research Consortium (LARRC) consisting of Gloria Yeomans-Maldonado (Convener), Carol Mesa, Ann A. O'Connell, and Laida Restrepo. LARRC project sites and investigators are as follows:

Ohio State University (Columbus, OH): Laura M. Justice (Site PI), Richard Lomax, Ann O'Connell, Jill Pentimonti[1], Stephen A. Petrill[2], Shayne B. Piasta

Arizona State University (Tempe, AZ): Shelley Gray (Site PI), Maria Adelaida Restrepo.

Lancaster University (Lancaster, UK): Kate Cain (Site PI).

University of Kansas (Lawrence, KS): Hugh Catts[3] (Site PI), Mindy Bridges, Diane Nielsen.

University of Nebraska-Lincoln (Lincoln, NE): Tiffany Hogan (Site PI), Jim Bovaird, J. Ron Nelson.[4]

MGH Institute of Health Professions (Boston, MA): Tiffany Hogan (Site PI)

1. Jill Pentimonti is now at American Institutes for Research (AIR).

2. Stephen A. Petrill was a LARRC co-investigator from 2010 to 2013.

3. Hugh Catts is now at Florida State University.

4. J. Ron Nelson was a LARRC co-investigator from 2010 to 2012.

Disclosure

We are deeply grateful to the numerous staff, research associates, school administrators, teachers, children, and families who participated. Key personnel at study sites include: Crystle Alonzo, Lisa Baldwin-Skinner, Lauren Barnes, Garey Berry, Beau Bevens, Jennifer Bostic, Shara Brinkley, Janet Capps, Tracy Centanni, Beth Chandler, Lori Chleborad, Emmanuel Cortez, Willa Cree, Dawn Davis, Kelsey Dickerhoof, Jaclyn Dynia, Michel Eltschinger, Kelly Farquharson, Tamarine Foreman, Yvonne Fraser, Abraham Aldaco Gastelum, Rashaun Geter, Sara Gilliam, Alexandria Hamilton, Cindy Honnens, Miki Herman, Hui Jiang, Elaine Joy, Jaime Kubik, Trudy Kuo, Gustavo Lujan, Chi Luu, Junko Maekawa, Carol Mesa, Denise Meyer, Maria Moratto, Kimberly Murphy, Marcie Mutters, Amy Pratt, Trevor Rey, Lizeth Sanchez-Verduzco, Amber Sherman, Shannon Tierney, Stephanie Williams, and Gloria Yeomans-Maldonado.

The views presented in this work do not represent those of the federal government, nor do they endorse any products or findings presented herein. Correspondence concerning this work should be sent to Gloria Yeomans-Maldonado, Children's Learning Institute,

Department of Pediatrics, University of Texas Health Science Center at Houston, 7000 Fannin, Houston, TX 77,030. E-mail: Gloria.Yeomans@uth.tmc.edu

CrediT author statement

G. Yeomans-Maldonado: Conceptualization, methodology, formal analysis, co-writing of original draft, co-reviewing and co-editing. C. Mesa: Conceptualization and co-writing of original draft; co-reviewing and co-editing. As part of the task force team of LARRC, L. Restrepo reviewed draft and provided edits and comments; A. O'Connell reviewed draft, provided edits and comments, and provided feedback on methodology and formal analysis.

Acknowledgments

Supplementary materials

Supplementary material associated with this article can be found, in the online version, at doi:10.1016/j.ecresq.2021.07.001.

References

Basto, M., & Pereira, J. M. (2012). An SPSS R-menu for ordinal factor analysis. *Journal of Statistical Software, 46*(4), 1–29.

Bitetti, D., & Hammer, C. (2016). The home literacy environment and the English narrative development of Spanish–English bilingual children. *Journal of Speech, Language, and Hearing Research, 59*(5), 1159–1171. https://doi.org/10.1044/2016_JSLHR-l-15-0064.

Boyce, L. K., Cook, G. A., Roggman, L. A., Innocenti, M. S., Jump, V. K., & Akers, J. F. (2004). Sharing books and learning language: What do Latina mothers and their young children do? *Early Education & Development, 15*(4), 371–386.

Burgess, S. R. (2011). Home literacy environments (HLEs) provided to very young children. *Early Child Development and Care, 181*(4), 445–462. https://doi.org/10.1080/03004430903450384.

Burgess, S. R., Hecht, S. A., & Lonigan, C. J. (2002). Relations of the home literacy environment (HLE) to the development of reading-related abilities: A one-year longitudinal study. Reading Research Quarterly, 37(4), 408-426.

Bus, A. G., van IJzendoorn, M. H., & Pellegrini, A. D. (1995). Joint book reading makes for success in learning to read: A meta-analysis on intergenerational transmission of literacy. *Review of Educational Research, 65*(1), 1–21.

Buysse, V., Peisner-Feinberg, E., Páez, M., Hammer, C. S., & Knowles, M. (2014). Effects of early education programs and practices on the development and learning of dual language learners: A review of the literature. *Early Childhood Research Quarterly, 29*(4), 765–785. https://doi.org/10.1016/j.ecresq.2013.08.004.

Caspe, M. (2009). Low-income Latino mothers' booksharing styles and children's emergent literacy development. *Early Childhood Research Quarterly, 24*(3), 306–324. https://doi.org/10.1016/j.ecresq.2009.03.006.

Castro, D. C., Mendez, J., Garcia, S., & Westerberg, D. (2012). Family literacy programs for Latino families in the United States. In B. H. Wasik (Ed.), *Handbook of family literacy* (pp. 270–288). New York: Routledge Taylor & Francis Group.

Castro, D. C., & Prishker, N. (2019). Early Childhood Care and Education for Bilingual Children and the Road to Multilingualism. In *The wiley handbook of early childhood care and education* (p. 173). NJ: John Wiley & Sons: Hoboken.

Catts, H. W., Herrera, S., Nielsen, D. C., & Bridges, M. S. (2015). Early prediction of reading comprehension within the simple view framework. *Reading and Writing, 28*(9), 1407–1425. https://doi.org/10.1007/s11145-015-9576-x.

de Brey, C., Musu, L., McFarland, J., Wilkinson-Flicker, S., Diliberti, M., Zhang, A., et al. (2019). *Status and trends in the education of racial and ethnic groups 2018*. Washington, DC: National Center for Education Statistics. Retrieved from (NCES 2019-038). U.S. Department of Education https://nces.ed.gov/pubsearch/.

DeBaryshe, B. D., & Binder, J. C. (1994). Development of an instrument for measuring parental beliefs about reading aloud to young children. *Perceptual and Motor Skills, 78*(3), 1303–1311. https://doi.org/10.2466/pms.1994.78.3c.1303.

Dickinson, D. K., Griffith, J. A., Golinkoff, R. M., & Hirsh-Pasek, K. (2012). How reading books fosters language development around the world. *Child Development Research, 2012*, 1–15. https://doi.org/10.1155/2012/602807.

Dunn, D. M., & Dunn, L. M. (2007). *Peabody picture vocabulary test: Manual*. MN: NCS Pearson: Bloomington.

Elleman, A. M., Lindo, E. J., Morphy, P., & Compton, D. L. (2009). The impact of vocabulary instruction on passage-level comprehension of school-age children: A meta-analysis. *Journal of Research on Educational Effectiveness, 2*(1), 1–44. https://doi.org/10.1080/19345740802539200.

Farstrup, A. E., & Samuels, S. J. (2002). *What research has to say about reading instruction* (Eds.) (3rd ed.). Newark, DE: International Reading Association.

Farver, J. A. M., Xu, Y., Eppe, S., & Lonigan, C. J. (2006). Home environments and young Latino children's school readiness. *Early Childhood Research Quarterly, 21*(2), 196–212. https://doi.org/10.1016/j.ecresq.2006.04.008.

Farver, J. A. M., Xu, Y., Lonigan, C. J., & Eppe, S. (2013). The home literacy environment and Latino head start children's emergent literacy skills. *Developmental Psychology, 49*(4), 775–791. https://doi.org/10.1037/a0028766.

Gonzalez, J. E., Acosta, S., Davis, H., Pollard-Durodola, S., Saenz, L., Soares, D., et al. (2017). Latino maternal literacy beliefs and practices mediating socioeconomic status and maternal education effects in predicting child receptive vocabulary. *Early Education and Development, 28*(1), 78–95. https://doi.org/10.1080/10409289.2016.1185885.

Gonzalez, J. E., Taylor, A. B., Davis, M. J., & Kim, M. (2013). Exploring the underlying factor structure of the Parent Reading Belief Inventory (PRBI): Some caveats. *Early Education & Development, 24*(2), 123–137. https://doi.org/10.2298/PSI130716007R.

Gonzalez, J. E., & Uhing, B. M. (2008). Home literacy environments and young Hispanic children's English and Spanish oral language: A communality analysis. *Journal of Early Intervention, 30*(2), 116–139. https://doi.org/10.1177/1053815107313858.

Griffin, E. A., & Morrison, F. J. (1997). The unique contribution of home literacy environment to differences in early literacy skills. *Early Child Development and Care, 127*(1), 233–243. https://doi.org/10.1080/0300443971270119.

Hammer, C. S., Lawrence, F. R., & Miccio, A. W. (2008). Exposure to English before and after entry into Head Start: Bilingual children's receptive language growth in Spanish and English. *International Journal of Bilingual Education and Bilingualism, 11*(1), 30–56.

Hammer, C. S., Miccio, A. W., & Wagstaff, D. A. (2003). Home literacy experiences and their relationship to bilingual preschoolers' developing English literacy abilities. *Language, Speech, and Hearing Services in Schools, 34*(1), 20–30. https://doi.org/10.1044/0161-1461(2003/003).

Hammer, C. S., Nimmo, D., Cohen, R., Draheim, H. C., & Johnson, A. A. (2005). Book reading interactions between African American and Puerto Rican Head Start children and their mothers. *Journal of Early Childhood Literacy, 5*(3), 195–227.

Hammer, C. S., & Sawyer, B. (2016). Effects of a culturally responsive interactive book-reading intervention on the language abilities of preschool dual language learners: A pilot study. *NHSA Dialog, 18*(4), 59–79.

Hoff, E., & Core, C. (2013). Input and language development in bilingually developing children. *Seminars in Speech and Language, 34*(4), 215–226. https://doi.org/10.1055/s-0033.

Huebner, C. E., & Payne, K. (2010). Home support for emergent literacy: Follow-up of a community-based implementation of dialogic reading. Journal of Applied Developmental Psychology, 31(3), 195-201.

Johnson, C. A. (2012). How do public libraries create social capital? An analysis of interactions between library staff and patrons. *Library & Information Science Research, 34*(1), 52–62.

Justice, L. M., Weber, S. E., Ezell, H. K., & Bakeman, R. (2002). A sequential analysis of children's responsiveness to parental print references during shared book-reading interactions. *American Journal of Speech-Language Pathology, 11*(1), 30–40. https://doi.org/10.1044/1058-0360(2002/004).

Kaufman, S. (2004). *Kaufman brief intelligence test–second edition (KBIT-2)*. Circle Pines, MN: American Guidance Service.

Kibler, K. A., Paulick, J., Palacios, N., & HillFirst, T. (2020). Shared book reading and bilingual decoding in latinx immigrant families. *Journal of Literacy Research, 52*(2), 180–208. https://doi.org/10.1177/1086296X20915511.

Kieffer, M. J., & Thompson, K. D. (2018). Hidden progress of multilingual students on NAEP. *Educational Researcher, 47*(6), 391–398. https://doi.org/10.3102/0013189X17877740.

Kieffer, M. J., & Vukovic, R. K. (2012). Growth in reading-related skills of language minority learners and their classmates: More evidence for early identification and intervention. *Reading and Writing, 26*(7), 1159–1194. https://doi.org/10.1007/s11145-012-9410-7.

Kim, Y. S. (2009). The relationship between home literacy practices and developmental trajectories of emergent literacy and conventional literacy skills for Korean children. *Reading and Writing, 22*(1), 57–84.

Language and Reading Research Consortium (LARRC), Mesa, C., & Yeomans-Maldonado, G. (2021). English and Spanish Predictors of Grade 3 Reading Comprehension in Bilingual Children. Journal of Speech, Language, and Hearing Research, 64(3), 889-908.

Leseman, P. P., & De Jong, P. F. (1998). Home literacy: Opportunity, instruction, cooperation and social-emotional quality predicting early reading achievement. Reading Research Quarterly, 33(3), 294-318.

Linberg, A., Lehrl, S., & Weinert, S. (2020). The early years home learning environment – associations with parent-child-course attendance and children's vocabulary at age 3. *Frontiers in Psychology, 11*, 1–13. https://doi.org/10.3389/fpsyg.2020.01425.

Mancilla-Martinez, J., Greenfader, C. M., & Ochoa, W. (2018). Spanish-speaking preschoolers' conceptual vocabulary knowledge: Towards more comprehensive assessment. *NHSA Dialog, 21*(1), 22–49.

Marín, G., & Marín, B. V. (1991). *Applied social research methods: Research with hispanic populations*. Newbury Park, CA: SAGE Publications.

Martin N. A., & Brownell R. (2010). Expressive One-Word Picture Vocabulary Test-4 (EOWPVT-4). Novato, CA: Academic Therapy Publications.

Mendive, S., Lara, M. M., Aldoney, D., Pérez, J. C., & Pezoa, J. P. (2020). Home language and literacy environments and early literacy trajectories of low-socioeconomic status Chilean children. *Child Development, 00*(0), 1–27. https://doi.org/10.1111/cdev.13382.

Mesa, C., & Restrepo, M. A. (2019). Effects of a family literacy program for Latino parents: Evidence from a single-subject design. Language, speech, and hearing services in schools, 50(3), 356-372.

Mol, S. E., Bus, A. G., de Jong, M. T., & Smeets, D. J. H. (2008). Added value of dialogic parent–child book readings: A meta-analysis. *Early Education and Development, 19*(1), 7–26. https://doi.org/10.1080/10409280701838603.

O'Connell, A. A., Logan, J., Pentimonti, J., & McCoach, D. B. (2013). Linear and Quadratic Growth Models for Continuous and Dichotomous Outcomes. In Y. Petscher & C. Schatschneider (Eds.). *Applied quantitative analysis in the social sciences*. NY: Routledge.

Ouellette, G. P. (2006). What's meaning got to do with it: The role of vocabulary in word reading and reading comprehension. *Journal of Educational Psychology, 98*(3), 554–566.

Payne, A. C., Whitehurst, G. J., & Angell, A. L. (1994). The role of home literacy environment in the development of language ability in preschool children from low-income families. *Early Childhood Research Quarterly, 9*(3–4), 427–440.

Perfetti, C. A., Landi, N., & Oakhill, J. (2005). The Acquisition of Reading Comprehension Skill. In *The science of reading: A handbook* (pp. 227–247). Oxford, United Kingdom: Blackwell Publishing.

Perry, N., Mitchell, S., & Brown, A. (2008). Continuity and change in home literacy practices of Hispanic families with preschool children. *Early Child Development and Care, 178*, 99–113. https://doi.org/10.1080/03004430701482191.

Proctor, C. P., August, D., Carlo, M. S., & Snow, C. (2006). The intriguing role of Spanish language vocabulary knowledge in predicting English reading comprehension. *Journal of Educational Psychology, 98*(1), 159–169. https://doi.org/10.1037/0022-0663.98.1.159.

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. https://doi.org/10.1037/0022-0663.97.2.246.

Raikes, H., Pan, B. A., Luze, G., Tamis-LeMonda, C. S., Brooks-Gunn, J., Constantine, J., et al. (2006). Mother–child bookreading in low-income families: Correlates and outcomes during the first 3 years of life. *Child Development, 77*(4), 924–953. https://doi.org/10.1111/j.1467-8624.2006.00911.x.

Reese, L., & Gallimore, R. (2000). Immigrant Latinos' cultural model of literacy development: An evolving perspective on home-school discontinuities. *American Journal of Education, 108*(2), 103–134. https://doi.org/10.1086/444236.

Reese, L., Thompson, S. L., & Goldenberg, C. (2008). Variability in community characteristics and Spanish-speaking children's home language and literacy opportunities. *Journal of Multilingual and Multicultural Development, 29*(4), 271–290. https://doi.org/10.1080/01434630802147759.

Rodríguez, B. L., Hammer, C. S., & Lawrence, F. R. (2009). Parent reading belief inventory: Reliability and validity with a sample of Mexican American mothers. *Early Education and Development, 20*(5), 826–844. https://doi.org/10.1080/10409280802581276.

Rodríguez, E., & Tamis-LeMonda, C. (2011). Trajectories of the home learning environment across the first 5 years: Associations with children's vocabulary and literacy skills at prekindergarten. *Child Development, 82*(4), 1058–1075. https://doi.org/10.1111/j.1467-8624.2011.01614.x.

Salinas, M., Perez-Granados, D., Feldman, H., & Huffman, L. (2017). Beyond immigrant status: Book-sharing in low-income Mexican-American families. *Journal of Early Childhood Research, 15*(1), 17–33. https://doi.org/10.1177/1476718X15577007.

Saracho, O. N. (1999). Families' involvement in their children's literacy development. *Early Child Development and Care, 153*(1), 121–126.

Sawyer, B. E., Cycyk, L. M., Sandilos, L. E., & Hammer, C. S. (2018). 'So many books they don't even all fit on the bookshelf': An examination of low-income mothers' home literacy practices, beliefs and influencing factors. *Journal of Early Childhood Literacy, 18*(3), 338–372. https://doi.org/10.1177/1468798416667542.

Sénéchal, M., & LeFevre, J. A. (2002). Parental involvement in the development of children's reading skill: A 5-year longitudinal study. *Child Development, 73*(2), 445–460. https://doi.org/10.1111/1467-8624.00417.

Sénéchal, M., & LeFevre, J. A. (2014). Continuity and change in the home literacy environment as predictors of growth in vocabulary and reading. *Child development, 85*(4), 1552–1568.

Sénéchal, M., LeFevre, J. A., Thomas, E. M., & Daley, K. E. (1998). Differential effects of home literacy experiences on the development of oral and written language. *Reading Research Quarterly, 33*(1), 96–116. https://doi.org/10.1598/RRQ.33.1.5.

Shahaeian, A., Wang, C., Tucker-Drob, E., Geiger, V., Bus, A. G., & Harrison, L. J. (2018). Early shared reading, socioeconomic status, and children's cognitive and school competencies: Six years of longitudinal evidence. *Scientific Studies of Reading, 22*(6), 485–502. https://doi.org/10.1080/10888438.2018.1482901.

Skibbe, L. E., Justice, L. M., Zucker, T. A., & McGinty, A. S. (2008). Relations among maternal literacy beliefs, home literacy practices, and the emergent literacy skills of preschoolers with specific language impairment. *Early Education and Development, 19*(1), 68–88. https://doi.org/10.1080/10409280701839015.

Snow, C. E., Barnes, W. S., Chandler, J., Goodman, I. F., & Hemphill, L. (1991). *Unfulfilled expectations: Home and school influences on literacy*. MA: Harvard University Press: Cambridge.

Solari, E. J., Aceves, T. C., Higareda, I., Richards-Tutor, C., Filippini, A. L., Gerber, M. M., et al. (2014). Longitudinal prediction of 1st and 2nd grade English oral reading fluency in English language learners: Which early reading and language skills are better predictors? *Psychology in the Schools, 51*(2), 126–142. https://doi.org/10.1002/pits.21743.

Steele, J., Slater, R., Zamarro, G., Li, J., Burkhauser, S., Miller, T., et al. (2017). Effects of dual-language immersion programs on student achievement: Evidence from lottery data. *American Educational Research Journal, 54*(1), 282S–306S. https://doi.org/10.3102/0002831216634463.

Trainin, G., Wessels, S., Nelson, R., & Vadasy, P. (2017). A study of home emergent literacy experiences of young Latino English learners. *Early Childhood Education Journal, 45*(5), 651–658. https://doi.org/10.1007/s10643-016-0809-7.

National Center for Education Statistics. (2019). English Language Learner (ELL) students enrolled in public elementary and secondary schools, by home language, grade, and selected student characteristics: Selected years, 2008-09 through fall 2017. Available at: http://www2.ed.gov/programs/osepidea/618-data/state-level-data-files/index.html#bcc 21 April 2020.

United States Census Bureau, (2017). *Hispanic Poverty Rate Hit an All-Time Low in 2017*. Available at: https://www.census.gov/library/stories/2019/02/hispanic-poverty-rate-hit-an-all-time-low-in-2017.html 21 April 2020.

United States Census Bureau, (2019). *Quick Facts provides statistics for all states and counties and for cities and towns with a population of 5,000 or more.* Available at: https://www.census.gov/quickfacts/fact/table/US/PST045219 21 April 2020.

Valentino, R. A., & Reardon, S. F. (2015). Effectiveness of four instructional programs designed to serve English learners: Variation by ethnicity and initial English proficiency. *Educational Evaluation and Policy Analysis, 37*(4), 612–637.

van Kleeck, A., Stahl, S. A., & Bauer, E. B. (2003). *On reading books to children: Parents and teachers*. Mahwah, NJ: Lawrence Erlbaum Associates.

Verhoeven, L., & Leeuwe, J. van. (2008). Prediction of the development of reading comprehension: A longitudinal study. *Applied Cognitive Psychology, 22*(3), 407–423. https://doi.org/10.1002/acp.1414.

Weigel, D. J., Martin, S. S., & Bennett, K. K. (2006). Contributions of the home literacy environment to preschool-aged children's emerging literacy and language skills. *Early Child Development and Care, 176*(3–4), 357–378. https://doi.org/10.1080/03004430500063747.

What Works Clearinghouse Standards (2017). In *What Works Clearinghouse*. Available at: https://ies.ed.gov/ncee/wwc/Docs/referenceresources/wwc_standards_handbook_v4.pdf, 21 April 2020.

Whitehead, N. (2004). The effects of increased access to books on student reading using the public library. *Reading Improvement, 41*(3), 165–179.

Wight, V., Chau, M. M., & Thampi, K. (2011). Poor children by parents' nativity: What do we know? *Mailman school of public health at Columbia University* New York City: National Center for Children in Poverty. https://doi.org/10.7916/D80P1706.

Williams, K. T., & Williams, K. T. (2007). *EVT-2: Expressive vocabulary test*. Minneapolis, MN: Pearson.

Yeo, L. S., Ong, W. W., & Ng, C. M. (2014). The home literacy environment and preschool children's reading skills and interest. *Early Education and Development, 25*(6), 791–814. https://doi.org/10.1080/10409289.2014.862147.