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## Impacts of a Literacy-Focused Preschool Curriculum on the Early Literacy Skills of Language-Minority Children

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### Abstract

Spanish-speaking language-minority (LM) children are at an elevated risk of struggling academically and display signs of that risk during early childhood. Therefore, high-quality research is needed to identify instructional techniques that promote the school readiness of Spanish-speaking LM children. The primary purpose of this study was to evaluate the effectiveness of an intervention that utilized an experimental curriculum and two professional development models for the development of English and Spanish early literacy skills among LM children. We also evaluated whether LM children's proficiency in one language moderated the effect of the intervention on early literacy skills in the other language, as well as whether the intervention was differentially effective for LM and monolingual English-speaking children. Five hundred twenty-six Spanish-speaking LM children and 447 monolingual English-speaking children enrolled in 26 preschool centers in Los Angeles, CA participated in this study. Results indicated that the intervention was effective for improving LM children's code-related but not language-related English early literacy skills. There were no effects of the intervention on children's Spanish early literacy skills. Proficiency in Spanish did not moderate the effect of the intervention for any English early literacy outcomes; however, proficiency in English significantly moderated the effect of the intervention for Spanish oral language skills, such that the effect of the intervention was stronger for children with higher proficiency in English than it was for children with lower proficiency in English. In general, there were not differential effects of the intervention for LM and monolingual children. Taken together, these findings indicate that high-quality, evidence-based instruction can improve the early literacy skills of LM children and that the same instructional techniques are effective for enhancing the early literacy skills of LM and monolingual children.

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## Keywords

language-minority; early literacy; oral language; phonological awareness; curriculum; professional development

Children who speak a language other than English at home are often referred to as language-minority (LM) children because their home language is not the language spoken by the majority of the population of the country in which they live. According to the U.S. Census Bureau (2014), 21% of the U.S. population over 5 years of age speaks a language other than English at home. The majority of the LM population in the U.S. speaks Spanish at home, and, in recent years, this group has expanded due to immigration from Latin America. Spanish-speaking LM children are often at an increased risk for the development of academic difficulties. Data from the National Assessment of Education Progress indicate that LM children in the U.S. score significantly lower than do their monolingual English-speaking peers on measures of reading at both 4<sup>th</sup> and 8<sup>th</sup> grades (Hemphill, Vanneman, & Rahman, 2011). Therefore, it is important to identify instructional techniques that improve the academic outcomes of LM children to begin to close the existing achievement gap.

## Early Literacy and Intervention

Early literacy skills are those skills that are the developmental precursors to conventional reading and writing skills and are measurable as early as the preschool years (Lonigan, Schatschneider, & Westberg, 2008a; Whitehurst & Lonigan, 1998). Three early literacy skills that are predictive of children's later reading abilities are oral language, phonological awareness, and print knowledge. Oral language refers to children's ability to convey and understand meaning effectively, and includes children's vocabulary and syntactic knowledge, among other skills. Phonological awareness refers to children's ability to detect and manipulate the individual sound components of words. Print knowledge refers to children's knowledge of letter names and letter sounds, as well as knowledge of the conventions of print (e.g., text is read from left to right in English and Spanish). Each of these early literacy skills is related to children's later reading abilities, including word reading and reading comprehension (e.g., Lonigan et al., 2008a; Storch & Whitehurst, 2002; Wagner et al., 1997), and some evidence suggests that phonological awareness is causally related to children's subsequent reading skills (Byrne & Fielding-Barnsley, 1995). Prior research concerning the development of academic skills indicates that children's reading abilities become remarkably stable in the early elementary years (Scarborough, 1998; Wagner, Torgesen, & Rashotte, 1994), highlighting the importance of early identification of risk for reading difficulties. Several studies indicate that the same precursor skills (i.e., oral language, phonological awareness, print knowledge) that are important predictors of later reading ability among monolingual children are important predictors of later reading ability among LM children (e.g., Lindsey, Manis, & Bailey, 2003; Mancilla-Martinez & Lesaux, 2010; Nakamoto, Lindsey, & Manis, 2008).

Despite the fact that Spanish-speaking LM children are at a substantial risk of developing reading difficulties (e.g., Hemphill et al., 2011) and display signs of that risk in early childhood (e.g., August & Shanahan, 2006; Lonigan, Farver, Nakamoto, & Eppe, 2013),

relatively little is known concerning effective preschool interventions to reduce this population's risk. In a recent review, Buysse, Peisner-Feinberg, Pérez, Hammer, and Knowles (2014) summarized the experimental evidence concerning preschool interventions for LM children. They reported that only 25 studies had evaluated preschool interventions for LM children, despite LM children comprising approximately one fifth of the population of school-age children in the U.S. Additionally, several of these studies had small sample sizes, limiting the generalizability of their results. One major issue in research on LM children is the lack of an operational definition for this population. Emerging evidence indicates there is substantial heterogeneity in the skills and experiences of LM children (e.g., Gonzalez et al., 2015). Furthermore, research has demonstrated that the development of first (L1) and second (L2) language literacy-related skills differs for children who are exclusively exposed to Spanish at home and children who are exposed to both Spanish and English at home prior to school entry (Hammer, Lawrence, & Miccio, 2008). Therefore, interventions that may be effective for some subpopulations of LM children may not be effective for others.

Buysse et al. (2014) reported that no studies of preschool interventions for LM children provided an operational definition of their population of interest, and the majority of studies relied upon a single method of identification of children as LM, with parent report being the most common method. Additionally, less than one third of the studies reviewed assessed outcomes in L1 and L2 using the same measures across languages. In sum, few conclusions can be drawn from the current evidence regarding effective early education practices to improve the early literacy skills of LM children due to inconsistencies in the types of interventions used in prior research and the numerous methodological issues that have plagued research with this population. Nevertheless, most prior studies reported positive effects of instruction in both L1 and L2, suggesting that the early literacy skills of LM children can be improved by high quality, evidence-based practices.

## Instructional Techniques for Early Intervention

Whereas there is limited evidence concerning the effectiveness of preschool interventions for LM children, researchers have identified several successful instructional techniques designed to improve early literacy skills among monolingual children. First, code-focused interventions are effective for improving children's code-related early literacy skills (Lonigan, Schatschneider, & Westberg, 2008b). Code-focused instructional techniques involve teaching the alphabetic principle (i.e., letters in written language correspond to sounds in spoken language) and explicitly teaching phonological awareness skills. These techniques have been shown to improve children's phonological awareness and print knowledge abilities as well as children's later reading and writing skills. Additionally, methods such as dialogic reading have been shown to be effective at improving children's oral language skills (e.g., Lonigan, Shanahan, & Cunningham, 2008; Zevenbergen, Whitehurst, & Zevenbergen, 2003). In dialogic reading an adult (e.g., teacher, parent) interacts with the child during shared book reading by using scaffolding techniques such as asking the child questions about the pictures in the book, responding to the child's answers, and providing assistance when the child appears to not have the language needed to describe information in the book. The utilization of effective instructional techniques, such as dialogic reading or phonological awareness training, is important for improving young

children's early literacy outcomes and potentially enhancing their later reading abilities, especially for those children at risk for the development of reading difficulties.

In a large-scale study of a preschool early literacy curriculum and two professional development models, Lonigan, Farver, Phillips, and Clancy-Menchetti (2011) reported significant and moderate effect sizes for a preschool curriculum that utilized techniques such as phonological awareness training and dialogic reading to improve children's early literacy skills. Children in classrooms that used the experimental curriculum scored significantly higher than did children in control classrooms on measures of oral language, phonological awareness, and print knowledge. When children in classrooms in which teachers attended professional development workshops were compared to children in classrooms in which teachers received in-class mentoring sessions in addition to attending professional development workshops the only significant group difference was for print knowledge scores. This finding suggests that in-class mentoring sessions provided to teachers were not sufficient to substantially improve student outcomes above and beyond the effects of attending professional development workshops alone.

## Early Intervention for LM Children

Studies of intervention effects among samples of LM children indicate that the same instructional techniques (e.g., dialogic reading, phonological awareness training) that are effective at enhancing the early literacy skills of monolingual children are effective at enhancing the L1 and L2 skills of LM children (e.g., Farver, Lonigan, & Eppe, 2009; Matera & Gerber, 2008). However, significant effects are often specific to the language of instruction, such that English-only instruction typically enhances children's English skills but has no effect on skills in L1, whereas instruction that incorporates both L1 and L2 can enhance children's early literacy skills in both languages. In fact, Farver et al. (2009) reported that children who received instruction in both Spanish and English demonstrated greater advantages over the control group for English oral language and print knowledge than did children who received instruction in English only.

According to the developmental interdependence hypothesis (Cummins, 1979), development of proficiency in L2 is dependent on the level of proficiency in L1 at the time of exposure to L2. Based on the idea that children utilize their L1 proficiency when learning L2, researchers have frequently argued that LM children can transfer early literacy skills across languages (e.g., Durgunoglu, Nagy, and Hancin-Bhatt, 1993); however, most studies of transfer simply evaluate cross-language correlations of L1 and L2 literacy-related skills. If cross-language transfer of early literacy skills does occur, intervention effects for LM children's L2 early literacy skills should be moderated by the level of L1 skill prior to the implementation of the intervention. At least one study has examined cross-language transfer in the context of an experimental intervention study (Goodrich, Lonigan, & Farver, 2013) and reported that children's L1 oral language and phonological awareness skills moderated the effect of the intervention on their L2 oral language and phonological awareness skills. Specifically, intervention effects were larger for children with stronger L1 oral language and phonological awareness skills at pretest than they were for children with weaker L1 oral language and phonological awareness skills at pretest.

Two prior studies have examined the effects of professional development models on the L1 and L2 early literacy skills of LM children (Buysse, Castro, & Peisner-Feinberg, 2010; Jackson, Larzelere, St. Claire, Corr, Fichter, & Egerston, 2006). Both studies reported positive effects of the interventions on teachers' classroom practices for teachers who were primarily monolingual English speakers, and Jackson et al. reported that these effects extended to children's early language and literacy skills. However, Buysse et al. (2010) only reported significant effects for Spanish phonological awareness. It is possible that the results of Buysse et al. did not extend to children's early language and literacy skills because their intervention utilized a professional development model in the absence of a specific curriculum. Jackson et al. (2006) also did not use a specific curriculum but found that the effects of their intervention did extend to children's early language and literacy skills in both languages; however, preschool centers were not randomly assigned to intervention groups, limiting the conclusions that can be drawn from the study. More research in this area is needed because relatively few studies have examined the impact of preschool curricula and professional development interventions for LM children, and this body of research is limited by inconsistencies across studies and methodological issues within studies.

## Current Study

The sample of children in the study by Lonigan et al. (2011) included a sizable number of Spanish-speaking LM children. Although Lonigan et al. reported significant positive impacts of the curriculum and professional development models for the overall sample, they did not examine the impact of the intervention separately for children who were monolingual English speakers and Spanish-speaking LM children. It is possible that interventions designed to improve early literacy skills have different effects for monolingual and LM children. For example, some studies of preschool curricula report greater effects of the curricula for children with lower English proficiency or less English exposure prior to preschool entry (e.g., Peisner-Feinberg, 2011). Moreover, some studies have reported that LM children's L1 skills moderate the effects of interventions designed to improve their skills in L2 (Goodrich, Lonigan, & Farver, 2013; Gormley, 2008; Lugo-Neris, Jackson, & Goldstein, 2010), suggesting that strong L1 skills serve as a protective factor for the development of L2 skills among at-risk LM children. Therefore, the purpose of this study was to examine how the intervention implemented in Lonigan et al. (2011) impacted the early literacy skills of LM children, as well as whether there were differential effects of the intervention for LM children and monolingual English-speaking children.

Building on prior research examining the development of early literacy skills among LM children and whether instructional techniques designed to improve those skills are effective, this study had three primary research questions. First, was an intervention that utilized an early literacy curriculum and two professional development models (Lonigan et al., 2011) effective for the development of English and Spanish early literacy skills among Spanish-speaking LM children? It was hypothesized that children in intervention groups would have stronger English early literacy skills at posttest than would children in the business-as-usual control group. However, consistent with results of prior research (e.g., Farver et al., 2009), it was not expected that levels of Spanish early literacy skills at posttest would differ across groups, as all instruction was delivered by monolingual English-speaking teachers without

providing any instructional support in children's native language. Second, did level of language proficiency in L1 moderate the effect of the intervention on L2 early literacy outcomes, and vice versa? Considering theory regarding the development of L1 and L2 literacy-related skills among LM children (Cummins, 2008) and evidence of cross-language transfer in the context of experimental intervention studies (e.g., Goodrich et al., 2013), it was hypothesized that level of proficiency in L1 would moderate the effect of the intervention on L2 outcomes. Specifically, it was expected that children with higher levels of proficiency in L1 would benefit more from the intervention on L2 outcomes than would children with lower levels of proficiency in L1. Finally, did the intervention differentially affect the development of early literacy skills for LM and monolingual children? Because evidence suggests that the same instructional techniques are effective at improving early literacy skills for monolingual and LM children, it was not expected that there would be differential effects of the intervention based on LM status.

## Method

### Participants

Over the course of two academic years, 1,100 children were recruited from 30 Head Start centers in Los Angeles, CA for participation in this study. This sample was part of a larger sample recruited from California and Florida for a large curriculum and professional development evaluation study. LM children were enrolled in 26 of the 30 preschool centers originally recruited for participation from the California site. Because research questions were focused on the effectiveness of the intervention for LM children, data from the 26 centers in which LM children were enrolled were used in this study. A total of 973 children were enrolled in these 26 preschool centers, and 526 of them (54%) were identified as Spanish-speaking LM children. All other children in the sample were monolingual English speakers. LM children in this sample ranged in age from 37 to 60 months ( $M = 51.55$  months,  $SD = 4.67$ ). Data on race and ethnicity were available for 469 LM children. Of these children, 466 were Latino (99.4%) and three were black/African American (0.6%). Approximately half (52%) of the LM children in this sample were male. Monolingual children in this sample ranged in age from 37 to 60 months ( $M = 50.73$  months,  $SD = 5.22$ ). Two hundred eighty-eight (64%) children were black/African American and 159 (35.6%) were Latino. Slightly more than half of the monolingual children in this sample were male (57%). The difference in average age of LM and monolingual children was statistically significant,  $t(821.56) = -2.50$ ,  $p < .05$ ; however, there was not a statistically significant difference in sex across LM and monolingual children,  $\chi^2 = 2.15$ ,  $p = .14$ . Experience among teachers that participated in this study ranged from 3 months to 32 years ( $M = 10.17$  years,  $SD = 8.26$  years). Teacher education ranged from a high school diploma or equivalent to a bachelor's degree. Approximately 7% of teachers reported having a bachelor's degree, 14% reported having an associate's degree, 54% reported having taken some college courses, and 25% reported having a high school diploma or equivalent. Almost all teachers (93%) reported having a Child Development Associate credential.



## Measures

**Oral language**—All children completed the Expressive Communication subtest of the Preschool Language Scale, 4<sup>th</sup> Edition (PLS-4; Zimmerman, Steiner, & Pond, 2002a). This test is a measure of children's expressive language skills. The Expressive Communication subtest assesses children's expressive vocabulary knowledge, as well as the ability to produce more complex language structures such as simple sentences. This measure has high internal consistency reliability for three- to five-year-old children ( $\alpha = .92-.95$ ). Spanish-speaking LM children also completed the Expressive Communication subtest of the Spanish Preschool Language Scale, 4<sup>th</sup> Edition (SPLS-4; Zimmerman, Steiner, & Pond, 2002b). The SPLS-4 is a Spanish-language adaptation of the PLS-4. This measure has high internal consistency reliability for three- to five-year-old children ( $\alpha = .86-.90$ ).

**Phonological awareness**—All children completed the Blending and Elision subtests of the Preschool Comprehensive Test of Phonological and Print Processing (P-CTOPPP; Lonigan, Wagner, Torgesen, & Rashotte, 2002). The Blending subtest requires children to combine words or parts of words to form new words. This subtest consists of 21 items, nine of which are multiple choice and 12 of which are free response. The Elision subtest requires children to remove sounds from a word to form a new word. This subtest consists of 18 items, nine of which are multiple choice and nine of which are free response. Items on the Blending and Elision subtests are administered in order of increasing difficulty and the test is structured to follow the developmental progression of phonological awareness (e.g., Anthony & Francis, 2005). Consequently, items on these subtests span the range of linguistic complexity (i.e., from whole words to individual phonemes). Spanish-speaking LM children also completed the Blending and Elision subtests of the Spanish Preschool Comprehensive Test of Phonological and Print Processing (P-CTOPPP-Spanish; Lonigan, Farver, & Eppe, 2002). The P-CTOPPP-Spanish is a Spanish-language adaptation of the P-CTOPPP and was designed to mirror the P-CTOPPP in structure and form. Both the Spanish Blending and Elision subtests contained 18 items, nine of which were multiple choice and nine of which were free response. Internal consistency reliability is high for these subtests for three- to five-year-old children ( $\alpha = .85-.87$ ).

**Print Knowledge**—All children completed the Print Knowledge subtest of the P-CTOPPP. The Print Knowledge subtest contains 36 items that measure children's knowledge of letter names, letter-sound correspondence, and print concepts. Spanish-speaking LM children also completed the Print Knowledge subtest of the P-CTOPPP-Spanish. Internal consistency reliability for this subtest is high for three- to five-year-old children ( $\alpha = .89-.95$ ).

## Procedure

Prior to participation, informed consent was obtained from parents or guardians of participants. Children completed assessments of early literacy skills at pretest and posttest. For Spanish-speaking LM children, order of administration of assessments was counterbalanced across language and English and Spanish assessments were completed on separate days that were no more than one week apart. Answers were only coded as correct if they were given in the language being assessed. All assessments were conducted in a quiet area of the child's preschool center by research assistants who were proficient in English and

Spanish and who had been trained to administer all assessments in both languages. Research assistants were responsible for speaking with children prior to testing to confirm that children were Spanish speakers.

Preschool centers were randomly assigned to one of three intervention groups, with the constraint that there were equal numbers of preschool centers in each group (i.e., 10 of the original 30 preschool centers in each group). All components of classroom instruction and the intervention were delivered in English<sup>1</sup>. The first intervention group was a business-as-usual control group that did not receive any components of the intervention (Control Group) and used the HighScope preschool curriculum. In this curriculum teachers engage in frequent adult-child interactions and emphasis is placed on classroom layout and consistent daily routines to support children's academic and socio-emotional development. HighScope represents an instructional framework with the intent of providing structure to the organization of the classroom environment and daily routines. HighScope does not specify a sequence of explicit academic instruction designed to target early literacy skills; rather, children often choose the activities they will engage in throughout the course of the day, and teacher-child discussions center around those activities.

The second intervention group received the Literacy Express Preschool Curriculum (LEPC; Lonigan, Clancy-Menchetti, Phillips, McDowell, & Farver, 2005) along with a series of professional development workshops that taught preschool teachers how to implement LEPC (Workshop Group). In contrast to the organizational model implemented in HighScope, LEPC was designed to utilize explicit instruction to promote development of children's early literacy skills and uses three types of small-group instruction: dialogic reading, phonological awareness activities (e.g., rhyming games), and print knowledge activities (e.g., letter and name writing). During implementation of LEPC preschool teachers are responsible for directing specific instructional activities in a sequence that corresponds to the developmental progression of early literacy skills. The small-group instructional framework provides teachers with the opportunity to individualize instruction based on students' needs. The third intervention group received LEPC along with professional development workshops and in-class mentoring sessions that afforded teachers the opportunity to witness the proper implementation of LEPC (Mentored Group). Researchers trained in the implementation of LEPC visited classrooms in the Mentored Group once each week throughout the school year to observe preschool teachers' implementation of the curriculum, provide feedback, model proper instructional techniques, and generally discuss the implementation of LEPC. Among the 26 centers in which LM children were enrolled, nine were assigned to the Control Group, nine were assigned to the Workshop Group, and eight were assigned to the Mentored Group.

Teachers at preschool centers assigned to the Workshop or Mentored Groups attended two full-day professional development workshops at the beginning of the preschool year and attended an additional four half-day professional development workshops throughout the preschool year. Workshops provided teachers with general information on the development

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<sup>1</sup>Despite large numbers of Spanish-speaking children enrolled in preschool centers, all lead teachers were monolingual English speakers.



of the early literacy skills targeted by the intervention (i.e., oral language, phonological awareness, and print knowledge), and instructed teachers in effective implementation of small-group instructional techniques (e.g., phonological awareness training, dialogic reading) designed to improve children's early literacy skills. Additionally, workshops provided information on how to use scaffolding techniques during instruction and how to properly organize and maintain a consistent classroom environment. Preschool teachers practiced the techniques taught during the workshops and received feedback from trained research assistants in charge of delivery of professional development workshops. All professional development activities in the second year of the study continued as implemented in the first year of the study. The original impact analysis of the intervention reported in Lonigan et al. (2011) included data from the first year of the study from all centers recruited in California and Florida; whereas this study used data from both years of the study and only from centers recruited in California.

### Data Analysis

To evaluate the first research question, whether the intervention was effective for LM children, multilevel ANCOVAs of English and Spanish early literacy skills at posttest were estimated. Mean scores at posttest were adjusted for child age, pretest scores, and the nested structure of the data (i.e., children within classrooms). Planned comparisons were evaluated for all models to determine whether the Workshop and Mentored Groups differed significantly from the Control Group as well as whether the Workshop and Mentored Groups differed significantly from each other. To evaluate the second research question, whether proficiency in L1 moderated the impact of the intervention on L2 early literacy skills, and vice versa, an interaction between intervention group and pretest language skills in the other language was added to the model. Follow-up tests for significant interactions tested the effect of the intervention at 1 *SD* below the mean, at the mean, and at 1 *SD* above the mean of pretest skills in the other language. For the full sample, only English early literacy outcomes were evaluated, and the interaction between intervention group and LM status was included in the model to determine whether there were differential effects of the intervention for LM and monolingual English-speaking children. Follow-up analyses for significant interactions tested the effect of the intervention at both levels of LM status (i.e., LM and monolingual). When evaluating whether the intervention was effective for LM children, the assumption of homogeneity of regression was tested by including the interaction between intervention group and each covariate (i.e., child age, pretest scores) in the model. When evaluating differential effects of the intervention for LM and monolingual children, the assumption of homogeneity of regression was tested by including a three-way interaction between intervention group, LM status, and each covariate in the model. All effect sizes (ES) were evaluated as Hedges' *g*.

Due to various issues related to data collection (e.g., children absent from school on assessment dates), there was some missing data. All LM children completed measures of Spanish and English oral language at pretest; however, pretest scores for Spanish and English phonological awareness and print knowledge were missing for approximately 20% of LM children. Any children with missing data for a specific dependent variable or covariate in a given model were not included in that model. For LM children, missing data

due to attrition or other data collection issues resulted in an analytic sample of 465 children for English oral language, 402 children for English blending, 401 children for English elision, 398 children for English print knowledge, 459 children for Spanish oral language, 417 children for Spanish blending, 418 children for Spanish elision, and 413 children for Spanish print knowledge. For the combined sample, pretest data (including child age) were completely missing for 40 children. Additional missing data resulted in a final analytic sample of 777 children for English oral language, 724 children for English blending, 722 children for English elision, and 717 children for English print knowledge.

## Results

### Preliminary Analyses

Classroom observation measures were recorded throughout the preschool year to determine whether there were differences in intervention and control classrooms, as traditional fidelity measures aligned with LEPC were not available. Descriptions of these measures are reported in the Online Supplementary Materials and descriptive statistics for these measures are reported in Table S1. Examination of descriptive statistics indicated that intervention classrooms scored higher than did control classrooms on measures of classroom quality and structure. Classrooms that received professional development workshops and mentoring sessions generally scored higher on measures of classroom quality than did classrooms that received professional development workshops alone. Additionally, more literacy-related instructional activities occurred in intervention classrooms than in control classrooms, with more literacy-related activities occurring in classrooms with teachers who received in-class mentoring than in classrooms with teachers who only received professional development workshops. However, most differences across intervention condition were not statistically significant, which was likely a result of low power to detect effects due to the relatively small number of classrooms in the analyses.

Descriptive statistics for English and Spanish early literacy skills at pretest for the Control, Workshop, and Mentored Groups are reported in Table 1. After controlling for child age, monolingual children scored higher on measures of English early literacy skills than did LM children at pretest (all  $p$ s < .01). After controlling for child age and pretest scores, monolingual children scored significantly higher on measures of English oral language and elision than did LM children at posttest ( $p$ s < .01); however, the difference between LM and monolingual children at posttest was only marginally significant for English blending ( $p$  = .06) and was non-significant for English print knowledge ( $p$  = .83).

For the combined sample (i.e., LM and monolingual children), children in the Workshop and Mentored Groups scored significantly higher at pretest on English oral language than did children in the Control Group ( $p$ s < .01). Additionally, children in the Mentored Group scored significantly higher on English blending at pretest than did children in the Control Group ( $p$  < .05). Conversely, children in the Control Group scored significantly higher on English elision at pretest than did children in the Workshop or Mentored Groups ( $p$ s < .05). Children in the Control Group and Mentored Group scored significantly higher on English print knowledge at pretest than did children in the Workshop Group ( $p$ s < .05). Overall, there

was not a consistent pattern to suggest that children in one intervention group had significantly stronger early literacy skills at pretest than did children in other groups.

### Impact of the Intervention on Early Literacy for Language-Minority Children

Results of impact analyses for all English and Spanish early literacy skills for LM children are reported in Table 2. For all English outcomes, the assumption of homogeneity of regression was met for child age and pretest scores. For English outcomes, there were significant effects of child age and pretest scores (all  $ps < .01$ ) on all outcomes, indicating that older children and children with stronger English early literacy skills at pretest had stronger English early literacy skills at posttest than did younger children and children with weaker English early literacy skills at pretest. LM children in the Mentored Group had significantly higher English elision and print knowledge scores at posttest than did LM children in the Control Group. Additionally, LM children in the Mentored Group had significantly higher English oral language scores at posttest than did LM children in the Workshop Group. To evaluate the second research question, the interaction between intervention group and pretest oral language scores in Spanish was added to models predicting English early literacy skills at posttest. Results indicated that Spanish oral language at pretest did not moderate the impact of the intervention for any English early literacy skill (all  $ps > .17$ ).

For all Spanish outcomes, the assumption of homogeneity of regression was met for child age and pretest scores. Additionally, child age and pretest scores were significant predictors of children's Spanish early literacy skills at posttest (all  $ps < .01$ ), indicating that older children and children with higher levels of Spanish early literacy skills at pretest scored higher on measures of Spanish early literacy at posttest than did younger children and children with lower levels of Spanish early literacy skills at pretest. There were no statistically significant differences in posttest scores across intervention groups. When evaluating the second research question, results indicated that English oral language at pretest moderated the effect of the intervention on Spanish oral language at posttest,  $F(2, 445.24) = 3.93, p < .05$ . Follow-up tests of this interaction are shown in Figure 1. There were no statistically significant differences between intervention groups at any level of English oral language. However, at 1 *SD* below the mean of English oral language, children in the Control Group had higher Spanish oral language scores at posttest than did children in the Workshop ( $ES = -.10, p = .37$ ) and Mentored Groups ( $ES = -.03, p = .81$ ). In contrast, at the mean and at 1 *SD* above the mean of English oral language, children in both the Workshop (mean,  $ES = .03, p = .81$ ; 1 *SD* above the mean,  $ES = .14, p = .19$ ) and Mentored Groups (mean,  $ES = .07, p = .55$ ; 1 *SD* above the mean,  $ES = .15, p = .19$ ) had higher Spanish oral language scores at posttest than did children in the Control Group. No other interaction effects were statistically significant (all  $ps > .19$ )<sup>2</sup>.

<sup>2</sup>We also examined whether the effect of the intervention was moderated by children's average level of language proficiency (computed from standard scores of L1 and L2 expressive language). For all English outcomes, average level of language proficiency did not moderate the effect of the intervention (all  $ps > .47$ ). For Spanish language outcomes, there was a significant moderation effect of average language proficiency for oral language ( $p < .01$ ) in a pattern consistent with the moderation effect of English proficiency. No other interaction effects were statistically significant (all  $ps > .11$ ).

## Impact of the Intervention on English Early Literacy for the Combined Sample

To evaluate the third research question, whether there were differential effects of the intervention for monolingual and LM children, impact analyses were conducted for the combined sample and an interaction between LM status and intervention group was included in the models. These results are reported in the lower panel of Table 3. Child age and pretest scores were significant predictors of all English early literacy skills at posttest, indicating that older children and children with stronger English early literacy skills at pretest scored higher on measures of English early literacy at posttest than did younger children and children with weaker English early literacy skills at pretest. For all outcomes, homogeneity of regression was met for child age. However, for oral language outcomes, the interaction between intervention group and LM status was moderated by English oral language scores at pretest,  $F(5, 737.22) = 4.94, p < .001$ . Therefore, this interaction term was included in the final model predicting English oral language.

Children in the Workshop Group had significantly higher English blending, elision and print knowledge scores at posttest than did children in the Control Group. Children in the Mentored Group had significantly higher English oral language, elision, and print knowledge scores at posttest than did children in the Control Group. Additionally, children in the Mentored Group had significantly higher English print knowledge scores at posttest than did children in the Workshop Group.

There were no statistically significant interactions between intervention group and LM status, indicating that, in general, there were not differential effects of the intervention for monolingual and LM children. However, for English oral language outcomes, the significant three-way interaction between intervention group, LM status, and English oral language scores at pretest indicated that at certain levels of English proficiency at pretest there was a differential impact of the intervention for monolingual and LM children. Follow-up tests for this interaction are shown in Figure 2. At low levels of English oral language at pretest, monolingual children in the Workshop ( $ES = .16, p = .23$ ) and Mentored Groups ( $ES = .09, p = .50$ ) had higher English oral language scores at posttest than did monolingual children in the Control Group, whereas LM children in the Control Group had higher English oral language scores at posttest than did LM children in the Workshop ( $ES = -.04, p = .71$ ) and Mentored Groups ( $ES = -.01, p = .92$ ); however, none of these differences were statistically significant. At average levels of English oral language at pretest, English oral language scores at posttest did not differ for monolingual children in the Workshop and Mentored Groups ( $ES = .08, p = .53$ ). In contrast, at average levels of English oral language at pretest, LM children in the Mentored Group had significantly higher English oral language scores at posttest than did LM children in the Workshop Group ( $ES = .24, p < .05$ ). At high levels of English oral language there were not differential effects of the intervention for LM and monolingual children.

## Discussion

The primary purpose of this study was to evaluate whether a curriculum and professional development intervention designed to improve children's early literacy skills was effective for Spanish-speaking LM children. Overall, results indicated that there were significant

impacts of the intervention for LM children's English phonological awareness and print knowledge skills. Consistent with hypotheses, there were no significant intervention effects for Spanish early literacy outcomes. The impact of the intervention was not moderated by children's level of early literacy skills at pretest, indicating that the intervention was equally effective for children with low and high levels of early literacy skills at preschool entry. A second purpose of this study was to evaluate whether children's level of proficiency in L1 moderated the impact of the intervention on L2 early literacy skills and vice versa. Results indicated that the impact of the intervention for English early literacy skills did not vary across levels of proficiency in Spanish; however, the effect of the intervention on Spanish oral language differed across levels of English proficiency at pretest. Finally, we evaluated whether there were differential impacts of the intervention for monolingual English-speaking children and Spanish-speaking LM children. Consistent with hypotheses, the intervention did not differentially impact monolingual and LM children's English code-related skills (i.e., phonological awareness, print knowledge). However, at certain levels of English proficiency at pretest there were differential effects of the intervention for LM and monolingual children's English oral language skills. In general, these findings demonstrate that the same instructional techniques shown to be effective for improving early literacy skills among monolingual children are effective for improving early literacy skills among LM children, consistent with results of prior intervention studies (e.g., Farver et al., 2009).

### Impact of the Intervention for LM Children

The results of the impact analyses indicated that high-quality instruction designed to improve early literacy skills was effective for LM preschoolers' code-related skills. Effect sizes reached a level of educational significance for English blending, elision and print knowledge (i.e., greater than or equal to .25; Tallmadge, 1977). Although effect sizes for oral language did not reach statistical significance, they did approach Cohen's (1992) threshold for a small effect (i.e., greater than or equal to .20), indicating that there was some degree of effectiveness of the intervention for improving LM children's English language skills. Despite substantial evidence for high-quality early literacy instruction for monolingual children (Lonigan & Shanahan, 2008), relatively few studies have examined whether the same instructional techniques that are effective for monolingual children are also effective for LM children. Additionally, many studies that have attempted to evaluate preschool curricula for LM children are limited by numerous methodological issues (Buysse et al., 2014).

Prior research has demonstrated that experimenter-delivered instruction is effective for improving the early literacy skills of LM children (e.g., Farver et al., 2009). However, small-group instruction delivered by highly-trained researchers is not easily applied on a large scale. This study demonstrated a significant impact of an intervention that utilized a professional development model in which preschool teachers were instructed in the delivery of the curriculum over a relatively short period of time (i.e., approximately four full days of professional development). Additionally, some teachers received the opportunity to witness the delivery of the curriculum in a classroom setting and get feedback on their own implementation of the curriculum. It is important to note that the majority of statistically significant effects of the intervention for LM children were for those children whose

teachers received in-class mentoring, although the differences between the Workshop and Mentored Groups were not generally statistically significant. This finding suggests that modeling and feedback are valuable experiences that help early childhood educators maximize the educational outcomes of LM students, consistent with findings of prior research indicating that higher doses of professional development are associated with larger effects on student outcomes (e.g., Yoon, Duncan, Lee, Scarloss, & Shapley, 2007). Although not statistically significant, professional development workshops accompanied by an evidence-based early literacy curriculum had a marginal impact on English phonological awareness skills and their effect on English print knowledge was of similar magnitude to the corresponding effects for English phonological awareness. These findings indicate that professional development supports for early childhood educators are effective for early literacy outcomes, albeit to a somewhat lesser degree than is the type of direct student instruction typically delivered in efficacy trials.

The impact of instruction for LM children in this study was language specific. All components of the intervention in this study were delivered in English, and the only significant effects of intervention group were for English outcomes. Prior studies have also reported effects specific to the language of instruction of the intervention (e.g., Farver et al., 2009), although evidence is mixed as to whether English-only or bilingual instruction provides the greatest benefit to Spanish-speaking LM children (Buysse et al., 2014; Cheung & Slavin, 2012; Francis, Lesaux, & August, 2006). Researchers and policy makers have long been engaged in debates regarding language of instruction for LM children. Results of this study suggest that instruction delivered only in L2 does not enhance LM children's L1 language and literacy skills, but it also did not have a negative effect on children's L1 language and literacy skills. In fact, although not statistically significant, the magnitude of the effect for Spanish print knowledge for children in the Workshop Group when compared to children in the Control Group reached a level of educational significance (Tallmadge, 1977). Given the large degree of overlap in print knowledge across Spanish and English, a relatively small amount of Spanish-language instruction accompanied by high-quality English-language instruction may be sufficient to boost LM children's Spanish print knowledge. However, because of the mixed evidence on language of instruction, further high-quality experimental research is needed to identify instructional techniques that maximize LM children's potential in both L1 and L2.

Statistically significant effects of intervention group were restricted to LM children's code-related skills (i.e., phonological awareness and print knowledge). One possibility for this finding is that the amount of exposure to language-focused instruction children received was not sufficiently large to yield an impact on LM children's oral language skills. Evidence indicates that LM children's vocabulary knowledge is distributed across their two languages, (e.g., Peña, Bedore, & Zlatić-Giunta, 2002), resulting in levels of single-language vocabulary knowledge that are lower than the typical levels of vocabulary knowledge of monolingual children. Because LM children often enter preschool with lower levels of English oral language than do monolingual children, more intensive language-focused instruction may be necessary for LM children to benefit from that instruction. Dialogic reading consists of getting children involved in discussions about stories they experience during shared book reading. It is possible that the LM children in this sample had



insufficient English oral language skills to effectively engage in open-ended discussion about the stories teachers were reading; however, in this study the effect of intervention group on English oral language at posttest was not moderated by children's English oral language skills at pretest. Prior studies have reported significant effects of dialogic reading interventions on the oral language skills of children with below-average language ability (Lonigan & Whitehurst, 1998; Whitehurst, Arnold, Epstein, Angell, Smith, & Fischel, 1994). Further research is needed to determine the type and amount of language-focused instruction that is needed to improve the oral language skills of LM children.

### Cross-Language Transfer

Prior research has demonstrated that LM children with higher levels of L1 skills benefit more from interventions designed to improve those same skills in L2 (e.g., Goodrich et al., 2013), suggesting that LM children can transfer some degree of knowledge of language and literacy skills across languages when provided with the instructional context to do so (Cummins, 2008). Additionally, certain cognitive advantages are thought to be associated with bilingualism (Adesope, Lavin, Thompson, & Ungerleider, 2010; Bialystok, 2011; Cummins, 1979). Therefore, we evaluated whether children's level of proficiency in one language moderated the effect of the intervention on early literacy skills in the other language (e.g., level of proficiency in L1 moderating the effect of the intervention on L2 outcomes). It was expected that children with higher levels of proficiency in L1 would benefit more from an intervention designed to improve language and literacy skills in L2, and vice versa. In contrast to theory and results of prior research, level of proficiency in L1 did not moderate any effect of the intervention for L2 outcomes; however, level of proficiency in L2 did significantly moderate the effect of the intervention for L1 oral language. Specifically, although no effects were statistically significant, effects of English oral language instruction on Spanish oral language skills were positive for children with high levels of proficiency in English and were negative for children with low levels of proficiency in English. Overall, this pattern of results did not support a broad role of cross-language transfer in the development of early literacy skills. Because effects of the intervention on Spanish oral language were not statistically significant at any level of English proficiency and instruction was only delivered in English, further research is needed to determine how different instructional contexts (e.g., L2 only, bilingual instruction, transitional instruction) allow LM children to leverage their preexisting knowledge when simultaneously acquiring language and literacy skills in L1 and L2.

According to Cummins' (1979) threshold hypothesis, children need to have acquired sufficient levels of proficiency in both languages for the cognitive benefits of bilingualism to emerge. If the threshold hypothesis is correct, it is possible that overall proficiency in both languages, rather than level of proficiency in one language, would better predict the transfer of knowledge and skills across languages. However, results of analyses examining whether average language proficiency (computed from Spanish and English standard scores) moderated the effect of the intervention demonstrated an identical pattern of results as did analyses examining whether level of proficiency in the other language moderated the effect of the intervention. It is possible that LM children in this study had not reached the threshold of bilingualism needed to reap the cognitive benefits thought to be associated with knowing

multiple languages, as average level of language proficiency in this sample approached two standard deviations below the normative mean. Additionally, it is possible that the cognitive benefits of knowing more than one language (e.g., Bialystok, 2011) may not extend to academic knowledge and skills until children reach more advanced developmental stages. Despite benefits in executive control for LM children, prior evidence indicates that level of proficiency in one language does not predict academic skills in another language when controlling for level of proficiency in the same language as the outcome (Kempert, Saalbach, & Hardy, 2011).

### **Differential Effects of the Intervention for LM and Monolingual Children**

In this sample, monolingual English-speaking children scored significantly higher at pretest on all measures of English early literacy skills than did LM children, after controlling for child age. LM status is frequently confounded with other factors associated with risk for educational difficulties, such as socioeconomic status (e.g., Hoff, Core, Place, Rumiche, Señor, & Parra, 2012). However, because all children in this sample were recruited from Head Start centers, these differences cannot solely be attributed to socioeconomic factors. Rather, it is likely that the lower English early literacy skills of LM children was a result of substantially reduced exposure to English (when compared to monolingual children) due to LM children's exposure to Spanish prior to preschool entry. Consistent with this explanation, the difference in English early literacy skills between LM and monolingual children was smaller at posttest and was not statistically significant for blending or print knowledge. Thus, it appears that once LM children enter preschool and have increased exposure to English, the achievement gap begins to narrow for some early literacy skills. This is consistent with prior research indicating that the gap in English proficiency between LM children who were and were not exposed to English at home narrows after exposure to English-language instruction in preschool (Hammer et al., 2008).

Consistent with hypotheses and results of prior research (Jackson et al., 2006), the intervention did not have consistent differential impacts on the English early literacy skills of LM and monolingual children. However, there were some differential effects of the intervention that were dependent on children's level of English proficiency at pretest. For children with low levels of proficiency in English (relative to other children in this sample), none of the intervention effects were statistically significant and the differential effect seems to be primarily driven by the Control Group (see Figure 2). For children with average levels of English proficiency (relative to other children in this sample), there was a significant difference between the Mentored and Workshop Groups for LM children but not for monolingual children. This finding suggests that preschool teachers may need more intensive professional development training to better serve the educational needs of LM children.

Overall, the lack of differential effects of the intervention reinforces the results of prior research that has identified the same instructional techniques as effective at improving early literacy skills for both LM and monolingual children (e.g., Farver et al., 2009; Lonigan, et al., 2008b; Zevenbergen et al., 2003). Although it appears that the initial gap in phonological awareness and print knowledge between LM and monolingual children narrowed over the

course of the preschool year, the absence of differential effects of the intervention suggests that this is a natural phenomenon associated with preschool entry and that LM children did not benefit more from the intervention than did monolingual English-speaking children. According to one theory, the development of code-related skills (such as phonological awareness) is directly related to the development of vocabulary knowledge (Metsala & Walley, 1998). As vocabulary knowledge increases and children encounter words that are phonologically similar to each other, children's sensitivity to small phonetic differences across words increases, improving phonological awareness skills. Because increased exposure to English associated with preschool entry has a larger impact on the growth of English vocabulary knowledge for children who were not exposed to English at home than it does for children who were exposed to English at home prior to preschool entry (Hammer et al., 2008), this increased vocabulary knowledge may result in increased English phonological awareness skills. Nevertheless, the lack of differential intervention effects indicates that to close the existing achievement gap between LM and monolingual children more intensive instruction may be needed. It is critical that future research identifies the type of instruction or the intensity of instruction necessary to begin to close the existing achievement gap during the preschool years, as children's reading ability becomes remarkably stable during early elementary school (Scarborough, 1998; Wagner, et al., 1994).

## Implications

Results of this study demonstrated that high-quality early literacy instruction is as effective for LM preschoolers as it is for monolingual preschoolers, consistent with prior research indicating that older LM children benefit from high-quality, systematic instruction demonstrated to be effective for monolingual children (e.g., Vaughn et al., 2006; see August & Shanahan, 2006, for review). Furthermore, this study extended previous findings indicating that researcher-delivered instruction is effective for LM children by showing effects of a professional development intervention for LM children's early literacy skills, which have been elusive in prior intervention studies (e.g., Buysse et al., 2010). These findings suggest that a structured curriculum should accompany professional development that educates teachers on the development of early literacy skills and effective instruction for those skills. Early childhood educators may need explicit instruction via modeling of the curriculum and feedback on their own implementation of the curriculum to provide the high-quality instruction necessary to improve LM children's early literacy outcomes. However, results of this study should be interpreted with caution. Although children whose teachers received in-class mentoring had significantly stronger early literacy skills at posttest than did children in the Control Group, differences between children whose teachers received in-class mentoring and children whose teachers only received professional development workshops were not as pronounced. Because of the significant cost of resources needed to provide preschool teachers with weekly mentoring sessions, additional research is needed to determine the amount of mentoring that early childhood educators need to provide high-quality instruction.

The intervention implemented in this study had only a modest impact on English oral language skills when monolingual and LM children were included in analyses, and did not have significant effects on the English and Spanish oral language skills of LM children.

These findings are consistent with prior research demonstrating that even though interventions may increase knowledge of words explicitly taught as part of the curriculum, it is difficult to improve children's scores on standardized measures of oral language skills (e.g., Bowyer-Crane et al., 2008; Neuman, Newman, & Dwyer, 2011). It is unclear whether difficulties in improving oral language skills reflect an issue of statistical power in cluster-randomized studies (e.g., Bowyer-Crane et al., 2008) versus those that randomly assign children to intervention group (e.g., Lonigan, Purpura, Wilson, Walker, & Clancy-Menchetti, 2013), is an issue related to how the intervention was delivered (i.e., teacher-delivered vs. researcher-delivered instruction), or if standardized measures of language skills do not have the sensitivity needed to detect modest improvements among children with limited language skills. It is possible that among studies in which larger effects of oral language are reported, research assistants may deliver instruction with more fidelity than do teachers in other studies who receive some professional development for curriculum implementation. If this is the case, to improve oral language skills it may be necessary to provide teachers with larger doses of professional development and design curricula that includes more individualized oral language instruction.

Young LM children may need more intensive language instruction than do monolingual children, as they often enter preschool with lower levels of proficiency in each language than do monolingual children. If the threshold hypothesis (Cummins, 1979) is valid, early, intensive instruction designed to improve LM children's L1 and L2 proficiency may have implications for children's ability to benefit from instruction in other academic domains. Future research should evaluate the effectiveness of intensive early language interventions for LM children.

### Limitations

Despite the numerous strengths of this study (e.g., sample size, random assignment to condition), this study had several limitations. First, all of the children in this sample were recruited from Head Start centers. Consequently, all children in this sample were at-risk for the development of academic difficulties. It is unknown whether the effect of the intervention for LM (or monolingual) children would be similar for children from a broader range of socioeconomic backgrounds. Additionally, this study only included African-American and Latino children. It is possible that there could be differential impacts of the intervention for LM children and monolingual children of other ethnicities. Third, this study did not have a long term follow-up to evaluate whether any effects of the intervention persisted into elementary school. Future studies should continue to evaluate LM children's language and literacy development in the early elementary years to determine whether professional development models and curricula that are effective at enhancing preschool early literacy skills can have long-term benefits, as some evidence suggests that current instructional techniques used to enhance the early literacy skills of LM preschoolers wash out once children enter kindergarten (Buysse et al., 2014). Finally, measures of fidelity of implementation that aligned with the LEPC curriculum used in this study were unavailable. Because of this limitation, classroom observation measures were used to determine differences in classroom environment for teachers in the business-as-usual control condition versus those that received professional development alone or a combination of professional

development and in-class mentoring. Teachers in the intervention conditions generally scored higher on classroom observation measures than did teachers in the business-as-usual control condition; however, most of these differences were not statistically significant.

## Conclusions

This study demonstrated that the same types of instructional techniques that are effective for improving early literacy skills among monolingual children are also effective for LM children. However, the results of this study should be interpreted with caution, as the largest effects for LM children's early literacy skills emerged only when professional development was accompanied by mentoring sessions designed to support the quality of teachers' instructional practices. Effects obtained were specific to the language of instruction and to LM children's code-related skills. Children's initial levels of proficiency in L1 did not moderate the impact of the intervention on L2 outcomes. Future research is needed to identify those instructional techniques that better improve the oral language skills of LM children and support the simultaneous development of early literacy skills in L1 and L2. Additionally, there were no differential effects of the intervention for LM and monolingual children. Because Spanish-speaking LM children typically have lower levels of reading skills than do monolingual English-speaking children in the U.S., future research is needed to determine the type and intensity of instruction required to begin to close the existing achievement gap. It is critical to bridge findings from research with educational practice to improve the L1 and L2 literacy outcomes of LM children.

## Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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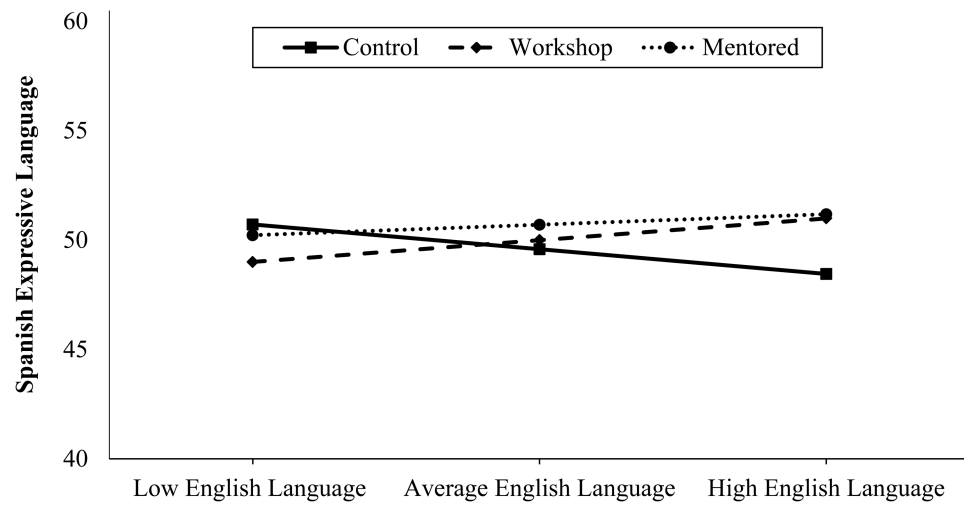


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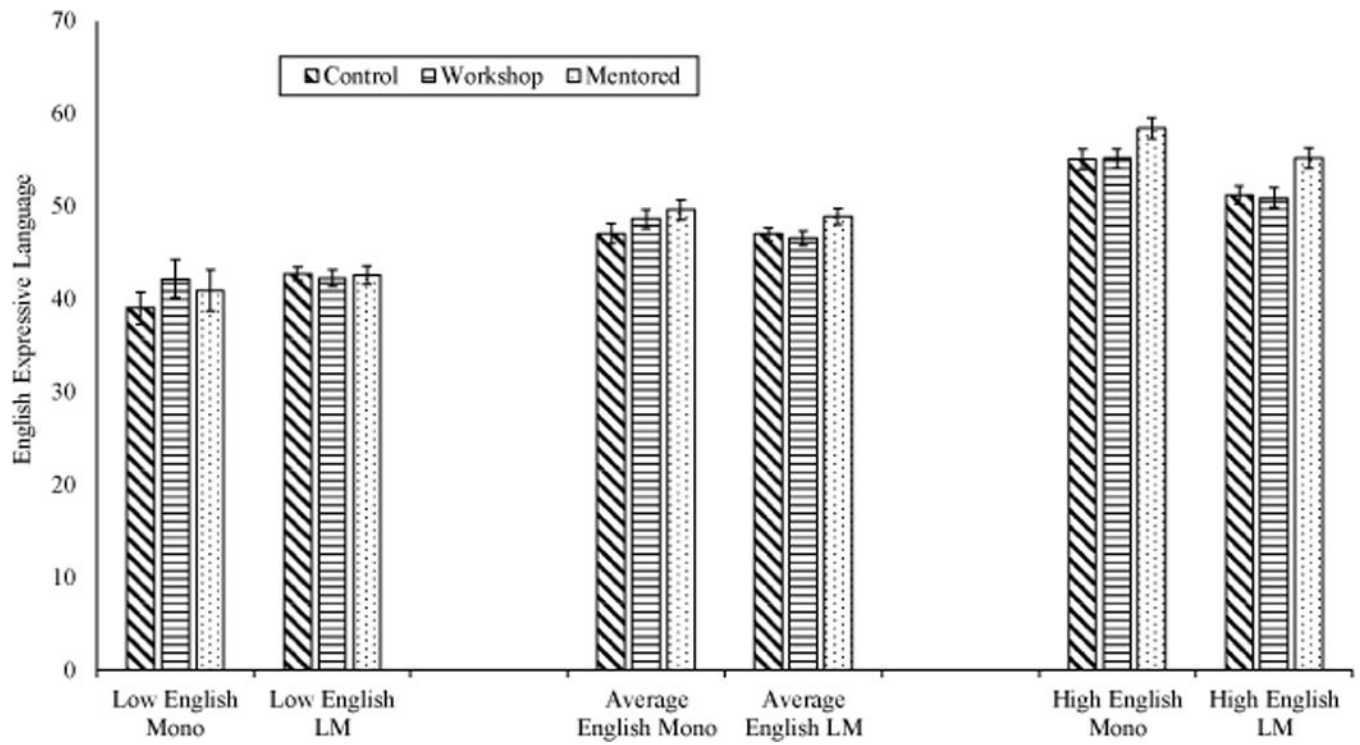
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**Research Highlights**

- An early literacy curriculum, combined with professional development that included workshops and in-class mentoring sessions, was effective at improving the code-related English early literacy skills of language-minority children.
- The intervention was similarly effective for language-minority and monolingual children.
- The intervention did not have a significant impact on language-minority children's Spanish early literacy skills.



**Figure 1.** Average Spanish expressive language scores at posttest for each intervention group at low, medium, and high levels of English proficiency at pretest.



**Figure 2.**

English expressive language scores at posttest for monolingual (Mono) and language-minority (LM) children in each intervention group at low, average, and high levels of English expressive vocabulary at pretest.

Table 1

**Descriptive statistics for Spanish and English early literacy skills at pretest for Spanish-speaking language minority children, monolingual children, and the full sample**

	Control		Workshop		Mentored	
	Adj. M	(SD)	Adj. M	(SD)	Adj. M	(SD)
Language-Minority Children -- English						
Language	30.93	(18.14)	35.83	(14.84)	37.24	(14.50)
Blending	10.15	(4.48)	9.28	(4.77)	10.08	(4.52)
Elision	5.48	(2.33)	4.93	(1.93)	5.30	(2.65)
Print	7.28	(4.32)	7.55	(4.32)	8.55	(6.42)
Language-Minority Children -- Spanish						
Language	37.47	(9.76)	36.39	(10.09)	37.66	(10.54)
Blending	10.81	(4.08)	10.08	(3.86)	9.94	(4.00)
Elision	5.62	(2.39)	5.31	(2.27)	5.28	(2.17)
Print	7.48	(3.88)	6.87	(3.02)	8.06	(4.98)
Monolingual Children -- English						
Language	45.17	(10.93)	46.60	(8.51)	46.02	(7.15)
Blending	12.00	(4.97)	11.44	(4.50)	11.40	(4.79)
Elision	6.79	(3.50)	6.03	(2.10)	6.27	(2.44)
Print	9.97	(7.33)	8.18	(5.24)	9.98	(7.46)
Full Sample -- English						
Language	34.03	(17.37)	40.53	(13.48)	41.47	(12.53)
Blending	10.72	(4.76)	10.22	(4.74)	10.08	(4.77)
Elision	5.96	(2.94)	5.44	(2.06)	5.84	(2.58)
Print	8.29	(5.85)	7.88	(4.77)	9.59	(7.05)

*Note.* Mean scores adjusted for child age and classroom nesting. Language = PLS; Blending, Elision, and Print = P-CTOPPP Subtests



**Table 2**  
**Adjusted posttest scores and effect sizes for measures of English and Spanish early literacy skills for language-minority children across Control, Workshop, and Mentored Groups**

Intervention Group		Workshop			Mentor			Effect Sizes		
Control										
Adj.-M	(SD)	Adj.-M	(SD)	Adj.-M	(SD)	Adj.-M	(SD)	W vs. C	M vs. C	M vs. W
English-Language Outcomes										
Language	46.99 (10.39)	46.63	(9.36)	48.93	(10.27)			-.04	.19 <sup>+</sup>	.23 <sup>*</sup>
Blending	11.90 (4.30)	13.04	(4.49)	12.52	(4.94)			.26 <sup>+</sup>	.14	-.11
Elision	6.16 (2.60)	6.86	(2.94)	7.08	(3.25)			.25 <sup>+</sup>	.32 <sup>*</sup>	.07
Print	13.61 (7.21)	15.20	(7.98)	16.74	(8.64)			.21	.40**	.19
Spanish-Language Outcomes										
Language	49.83 (6.60)	50.10	(8.11)	50.79	(8.64)			.04	.13	.08
Blending	11.25 (3.65)	11.36	(3.64)	11.86	(3.96)			.03	.16	.13
Elision	6.01 (2.53)	6.16	(2.60)	5.99	(2.56)			.06	-.01	-.07
Print	10.49 (4.82)	11.89	(6.10)	11.29	(6.29)			.26	.15	-.10

*Note.* Posttest means adjusted for child age, pretest score, and clustering effect of preschool center. C = Control Group. W = Workshop Group. M = Mentored Group. Language = PLS. Blending, Elision, and Print = P-CTOPPP Subtests.

<sup>+</sup>  $p < .10$ .

<sup>\*</sup>  $p < .05$ .

Table 3

Adjusted posttest scores and effect sizes for measures of English early literacy skills for the full sample and monolingual children only across the Control, Workshop, and Mentored Groups

	Control			Workshop			Mentored			Effect Size		
	Adj. M	(SD)		Adj. M	(SD)		Adj. M	(SD)		W vs. C	M vs. C	M vs. W
<b>Monolingual</b>												
Language	47.06	(9.98)		48.68	(6.85)		49.64	(7.39)		.19	.30 <sup>+</sup>	.13
Blending	12.12	(4.28)		13.73	(4.73)		13.24	(4.44)		.36 <sup>*</sup>	.26	-.11
Elision	6.80	(3.38)		8.10	(3.27)		8.12	(3.41)		.39 <sup>**</sup>	.39 <sup>**</sup>	.01
Print	12.71	(8.22)		15.46	(8.23)		17.53	(9.04)		.33 <sup>*</sup>	.56 <sup>***</sup>	.24 <sup>+</sup>
<b>Full Sample</b>												
Language	47.03	(10.67)		47.66	(8.91)		49.29	(9.44)		.06	.22 <sup>*</sup>	.18
Blending	12.01	(4.38)		13.39	(4.64)		12.88	(4.74)		.31 <sup>*</sup>	.19	-.11
Elision	6.48	(3.02)		7.48	(3.20)		7.60	(3.41)		.32 <sup>**</sup>	.35 <sup>**</sup>	.04
Print	13.16	(7.66)		15.33	(8.08)		17.14	(8.94)		.28 <sup>*</sup>	.48 <sup>***</sup>	.21 <sup>*</sup>

Note. Posttest means adjusted for child age, pretest score, and clustering effect of preschool center. C = Control Group. W = Workshop Group. M = Mentored Group. Language = PLS. Blending, Elision, and Print = P-CTOPPP Subtests.

<sup>+</sup>  $p < .10$ .

<sup>\*</sup>  $p < .05$ .

<sup>\*\*</sup>  $p < .01$ .

<sup>\*\*\*</sup>  $p < .001$ .