Published in final edited form as:
J Educ Psychol. 2013 May ; 105(2): 414–426. doi:10.1037/a0031780.

Do Early Literacy Skills in Children's First Language Promote Development of Skills in Their Second Language? An Experimental Evaluation of Transfer

J. Marc Goodrich[1], **Christopher J. Lonigan**[1], and **JoAnn M. Farver**[2]
[1]Florida State University
[2]University of Southern California

Abstract

The purpose of this study was to evaluate the cross-language transfer of the emergent literacy skills of preschoolers who were Spanish-speaking language minority children in the context of an experimental intervention study. Ninety-four children were randomly assigned to either a control condition (High/Scope preschool curriculum) or to receive small-group pull-out instruction (Literacy Express Preschool Curriculum) in English or initially in Spanish and transitioning to English. We examined whether children's initial skills in one language moderated the impact of the intervention on those same skills in the other language at posttest. Results demonstrated that, for children in the English-only intervention condition, initial Spanish receptive vocabulary and elision skills moderated the impact of the intervention on English receptive vocabulary and elision skills at posttest, respectively. For children in the transitional intervention condition, initial English definitional vocabulary and elision skills moderated the impact of the intervention on Spanish definitional vocabulary and elision skills at posttest, respectively. Results for the vocabulary interactions, as well as the elision interaction for the English-only intervention group comparisons, supported the notion of transfer of specific linguistic information across languages. Results for elision interaction for the transitional intervention group comparisons supported language-independent transfer. Implications for the theory of cross-language transfer of emergent literacy skills are discussed.

Keywords

English language learners; language minority; emergent literacy; transfer

Latinos comprise the largest and fastest growing segment of the U.S. population. As of 2011, the U.S. Census Bureau (www.census.gov) reported that there were over 49 million people of Latino origin living in the U.S., comprising over 16% of the population. This population grew an estimated 3.2% from 2007 to 2008 (approximately 1.5 million), and it continues to grow rapidly due to immigration from many Latin American countries. In the U.S., 26% of the population 5 years of age and younger as well as 23% of the population 18 years of age and under is of Latino descent. Latino students now comprise the second largest population of students within the U.S. (National Assessment of Education Progress [NAEP],

Correspondence regarding this article should be directed to J. Marc Goodrich, Department of Psychology, Florida State University, 1107 W. Call Street, Tallahassee FL 32306-4301 (marcgoodrich5@gmail.com) or to Christopher J. Lonigan, Department of Psychology, Florida State University, 1107 W. Call Street, Tallahassee FL 32306-4301 (lonigan@psy.fsu.edu).
J. Marc Goodrich, Department of Psychology and the Florida Center for Reading Research, Florida State University. Christopher J. Lonigan, Department of Psychology and the Florida Center for Reading Research, Florida State University. JoAnn M. Farver, Department of Psychology, University of Southern California.

2011). Children who are exposed to a significant amount of Spanish in the home comprise a large portion of the U.S. Latino population and are at a particularly high risk for developing reading problems. The U.S. Census Bureau (2007) reported that 12.3% of the U.S. population over 5 years of age speaks Spanish or a Spanish Creole at home. Latino children who speak Spanish are often referred to as either Spanish-speaking English language learners (ELLs) or language minority (LM) children. An important distinction between these two classifications is that children identified as Spanish-speaking ELLs must have limited English proficiency; however, LM refers to children who are exposed to a language other than English in the home but who do not necessarily have limited English proficiency. Therefore, LM children encompass all children who are exposed to Spanish in the home whether or not they have limited English proficiency.

Children's language background is an important factor for evaluating their risk status for reading difficulties, and U.S. Latino children are at a high risk of developing reading problems. According to the NAEP (2011), there is a large gap between the reading performance of Latino children and the reading performance of white children. Although the overall reading scores of both 4^{th} and 8^{th} grade Latino students have improved from 1992 to 2009, the gap between Latino and white students has remained constant. Latino children represent a significant challenge to educators who are charged with the task of helping these children develop their reading skills and to narrow the existing performance gap between Latino and white students.

Research indicates that emergent literacy skills are associated with children's later reading skills and are measurable as early as the preschool years (Whitehurst & Lonigan, 1998). Specifically, the three skills that are the most predictive of future reading ability in monolingual English-speaking children are phonological awareness (PA), print knowledge, and oral language (Lonigan, Schatschneider, & Westberg, 2008; Whitehurst & Lonigan, 1998). PA is a child's ability to detect and manipulate the sounds of spoken language independent of the semantic properties of those sounds. Print knowledge is children's understanding of how print is organized, as well as letter-name and letter-sound knowledge. Oral language consists of a child's vocabulary, as well as his or her ability to use vocabulary within context to convey and understand meaning. Understanding these precursors to reading is important because reading ability becomes relatively stable as early as kindergarten (Wagner, Torgesen, & Rashotte, 1994; Wagner et al., 1997). Although these emergent literacy skills are often correlated with one another, they are each distinct skills that uniquely predict children's later reading abilities (Whitehurst & Lonigan, 1998).

Although there is a large body of research examining reading and reading-related skills of monolingual English-speaking children, there is substantially less research concerning reading and reading-related skills of LM children. Most research that has examined reading and reading-related skills of LM children indicates that most of the same factors that contribute to reading difficulty or success among monolingual English-speaking students also contribute to later reading difficulty or success among LM children (e.g., Lindsey, Manis, & Bailey, 2003; Manis, Lindsey, & Bailey, 2004). For example, word identification skills have similar developmental trajectories for both LM and monolingual English-speaking children from kindergarten through second grade (Manis et al., 2004). Similarly, skills such as phonological awareness, oral language, and print knowledge that predict reading outcomes in monolingual English-speaking students also predict reading outcomes among LM children (Lindsey et al., 2003; Manis et al., 2004).

Researchers have investigated the relations between first language (L1) and second language (L2) emergent literacy skills of Latino LM children. This research has examined whether or not the level of proficiency of emergent literacy skills in children's L1 predicts their

competency in L2 (e.g., Leafstedt & Gerber, 2005; Lopez & Greenfield, 2004; Tabors, Páez, & Lopez, 2003). Research has demonstrated that for LM children, skills within the domain of PA are related both within and across languages (e.g., Branum-Martin et al., 2006; Gottardo, 2002; Gottardo & Mueller, 2009; Leafstedt & Gerber, 2005). Specifically, children with strong L1 PA skills tend to have strong L2 PA skills (e.g., Atwill, Blanchard, Gorin, & Burstein, 2007). Although some researchers claim that evidence indicating that children's L1 skills predict their competency in L2 demonstrates that children "transfer" these skills across languages, some researchers have demonstrated that L1 and L2 PA skills are separate but related constructs; that is, they form distinct factors--even though the factors are correlated with one another--when examined using confirmatory factor analysis (Branum-Martin et al., 2006; Gottardo & Mueller, 2009).

Most prior studies on the relations between L1 and L2 reading-related skills have focused on LM children in the early elementary school years. Less research has been conducted with LM children in preschool. Studies indicate that there are positive correlations between the L1 and L2 PA skills of LM preschool children (Anthony et al., 2009; Dickinson, McCabe, Clark-Chiarelli, & Wolf, 2004; Lopez & Greenfield, 2004; Tabors et al., 2003). More research examining cross-language relations of emergent literacy skills with LM preschool children is needed to determine fully if, how, and when these emergent literacy skills transfer from one language to another.

Cummins (1979) introduced the Developmental Interdependence Hypothesis (DIH) of cross-language transfer as an attempt to explain the development of language and literacy skills of LM children. He proposed that, among LM children, development of language-related skills in children's L2 is dependent upon the proficiency of those skills in children's L1. More specifically, according to the DIH, the ability to acquire proficiency in L2 depends on the competence of the individual in L1 skills at the time of initial exposure to L2; however, this transfer is not automatic. According to the DIH, children's skills in one language will transfer to a second language only if there is sufficient exposure to that language (a characteristic of L2 input) and motivation to learn it (an attribute of the individual learning the L2; Cummins, 1981). The importance of exposure to L2 is highlighted by consistent findings that the length of residency in a country in which the primary language is the individual's L2 is strongly related to L2 acquisition (Cummins, 1991); however, attributes of the individual learning the L2 are also important for the development of strong L2 skills, as evidenced by the finding that cognitive and personality characteristics contribute as much to the development of L2 academic proficiency as does length of residency (Cummins et al., 1984).

Cummins (1981) integrated the notion of a common underlying proficiency (CUP) within the DIH as an additional perspective on the phenomenon of transfer. He stated that in addition to L1 or L2 instruction leading to the development of skills in that particular language, "experience with either language can promote development of the proficiency underlying both languages" (Cummins, 1981, p. 25). Once this CUP is developed, children are able to apply this knowledge to any subsequently learned language (i.e., "transfer" skills from one language to another). Reviews of research evaluating the DIH have indicated that there is strong support for this theory (Fitzgerald, 1995). The notion of a CUP is similar to hypotheses advanced by others. For example, the General Abilities Model (e.g., Castilla, Restrepo, & Perez-Leroux, 2009) posits that the strong relation between skills in L1 and L2 represents an underlying language-learning capacity that children have independent of their intelligence or overall cognitive abilities.

In Cummins' theory (e.g., 1981, 2008) DIH and CUP are viewed as essentially the same phenomenon; however, the theory allows both for cross-linguistic relations of skills that are

due to actual transfer from one language to another and for cross-linguistic relations of skills that are due to language-independent attributes of the individual that are related to performance in both languages. Understanding which process underlies cross-linguistic relations for specific skills is important to advancing knowledge concerning the development of academic skills in LM children and may have implications for assessment, identification, and instruction (Castilla et al., 2009). Therefore, in this study, we use CUP to refer to language-independent processes that are related to transfer and DIH to refer to direct transfer of specific linguistic information across languages.

Cummins (1991) proposed that two specific predictions can be drawn from the DIH: (a) L1 and L2 skills that are related across languages can be attributed to both underlying attributes of the individual learning the L2 as well as the quality and quantity of L2 input received; and (b) L1 and L2 skills that are not related across languages solely represent the quality and quantity of L2 input received, not underlying attributes of the individual. To the extent to which there is a large degree of overlap of sounds across languages, PA would be a specific-language-independent skill. LM children who can detect and manipulate sounds in one of their languages should also be able to detect and manipulate those same sounds in their other language. Therefore, cross-language relations between skills that are specific-language-independent such as PA should be related to attributes of the individual (i.e., an underlying language-learning capacity and development of a CUP) and the quality/quantity of input. In contrast, cross-language relations between skills that are language specific, such as vocabulary knowledge, should be related solely to the quality/quantity of input received.

Although results of a number of studies seem to support the DIH and the presence of a CUP (e.g., Lopez & Greenfield, 2004; Tabors et al., 2003), all of these studies are correlational, leaving their results open to alternative interpretations. Transfer implies something more than the simple co-occurrence of skills; namely, if children received instruction on particular skills in one language they should demonstrate gains in those same skills in their other language, provided they receive adequate exposure to their other language, either at home, with their peers, or at school. To test adequately whether transfer occurs, either experimental evidence or longitudinal data are necessary.

Farver, Lonigan, and Eppe (2009) reported the results of a study in which the impacts of two variations of a small-group early literacy intervention were evaluated relative to a business-as-usual control with Spanish-speaking LM preschool children. In one intervention condition, children received all instruction in English. In the other condition, children initially received instruction in Spanish, and instruction was transitioned to English over the preschool year. Farver et al. reported that children in both interventions ended the preschool year with significantly better scores on all measured early literacy skills than did children in the control condition. The goal of the current study was to expand on the analysis conducted by Farver et al. to determine if the emergent literacy skills of preschool LM children transfer from one language to another in the context of instruction aimed at improving these skills by examining whether children's initial L1 skills moderated the impact of the intervention designed to improve those skills in children's L2 and vice versa. The data used for this study were the same data used by Farver et al. Whereas Farver et al. evaluated the overall impact of the intervention, this study evaluated whether children's pretest skills moderated the impact of the intervention. This analysis represents a better test of transfer than do simple correlational studies because it examines the impact of skills in children's L1 on skills in their L2 in the context of experimentally manipulated instruction designed to improve their L2 skills. For example, if children with higher initial L1 skills benefit more from the intervention than do children with lower initial L1 skills, it can be concluded that a part of the positive impact of the intervention on L2 skills was the result of strong initial L1 skills.

To test how children's initial L1 skills moderated the impact of the intervention, moderation was tested in two steps. First, the moderation of the impact of the intervention by initial L1 or L2 skills was tested for L2 and L1 outcomes, respectively, to determine if children with greater initial skills in one language benefitted more from an intervention on those same skills in their other language. Then, the moderation of the impact of the intervention by initial skills in the same language as the outcome was added to the models. This second interaction term evaluated the degree to which the CUP across languages accounted for transfer. To demonstrate support for the transfer of specific linguistic information (i.e., a CUP-independent DIH), the initial moderation effect would have to remain significant when tested in the context of the second interaction term. In contrast, support for the CUP model would be obtained if a significant initial moderation effect were rendered non-significant by the inclusion of the second interaction term. Support could be obtained for both the CUP-independent DIH and the CUP model if both interaction terms were significant. For example, it is possible that children transfer specific linguistic information about skills across languages as well as utilize a CUP to benefit from instruction. Because prior research suggests that “backwards” transfer (i.e., transfer from L2 to L1) can occur (e.g., Dressler & Kamil, 2005), analyses of the influence of L2 on L1 were included as well (i.e., do Spanish-speaking LM children with greater initial English skills benefit more from an intervention designed to improve their Spanish-language skills than do Spanish-speaking LM children with weaker initial English skills?).

It was hypothesized that for all skills, children with higher initial skills in either L1 or L2 would benefit more from an intervention designed to promote skill development in the other language than would children with lower initial L1 or L2 skills. Moreover, it was hypothesized that for those skills that are specific-language independent (i.e., PA), results would support the CUP model, whereas for those skills that are language-specific (i.e., Print Knowledge, Receptive and Definitional Vocabulary), results would support a CUP-independent DIH and transfer of specific linguistic information.

Method

Participants

Ninety-four Spanish-speaking LM children from 10 classes in a Head Start center in Los Angeles, CA participated in this study. All children participating in this study were born in the United States. Fifty-one (54.3%) participants were male, and all were Latinos. The mean age of the participants was 54.51 months (*SD* = 4.72 months).

Measures

Measures of emergent literacy skills were administered to children in both English and Spanish using the Preschool Comprehensive Test of Phonological and Print Processing (P-CTOPPP; Lonigan, Wagner, Torgesen, & Rashotte, 2002) and the P-CTOPPP-Spanish (Lonigan, Farver, & Eppe, 2002). The P-CTOPPP contains five subtests: Receptive Vocabulary, Definitional Vocabulary, Blending, Elision, and Print Knowledge. The Vocabulary and Print Knowledge subtests of the P-CTOPPP-Spanish are a direct translation of the items on the English version of the assessment. The Blending and Elision subtests--both measures of PA--of the P-CTOPPP-Spanish are a Spanish language adaptation of the Blending and Elision subtests of the P-CTOPPP. The P-CTOPPP was the development version of the Test of Preschool Early Literacy (TOPEL; Lonigan, Wagner, Torgesen, & Rashotte, 2007), which includes only versions of the Definitional Vocabulary, Phonological Awareness (a combination of blending and elision items), and Print Knowledge subtests. Subtests on the TOPEL have good evidence of validity, with strong correlations between the TOPEL subtests and other measures of each construct.

Vocabulary measures—On the Definitional Vocabulary subtest, children were shown a picture and then asked to name the object in the picture and to describe one of its important features. This subtest contained 40 items that each had two parts. The first part of this task assessed children's expressive vocabulary skills, whereas the second part assessed children's definitional vocabulary skills. On the Receptive Vocabulary subtest, children were shown a page with four pictures and asked to point to the picture of the thing named by the examiner. This subtest contained 40 items. Internal consistency reliability for Receptive and Definitional Vocabulary subtests in both languages was moderate to high in this sample (Receptive Vocabulary: English alpha = .87, Spanish alpha = .83; Definitional Vocabulary: English alpha = .98, Spanish alpha = .97).

Phonological awareness measures—Items on the Elision subtest required children to remove parts of words to form a new word. Items on the Blending subtest required children to combine words or parts of words to form a new word. The English Blending subtest contained 21 items, and the English Elision subtest contained 18 items. Of the 21 Blending items, nine were multiple choice and 12 were free response. The 18 Elision items were split evenly between multiple choice and free response. Both the Spanish Blending subtest and the Spanish Elision subtest contained 18 items, with items split evenly between multiple choice and free response. Internal consistency reliabilities for both Blending and Elision subtests in both languages were adequate to marginal in this sample (Blending: English alpha = .86, Spanish alpha = .81; Elision: English alpha = .72, Spanish alpha = .66).

Print knowledge measures—The Print Knowledge subtest assessed children's print concepts, letter discrimination, word discrimination, letter-name knowledge, and knowledge of letter-sound correspondence. The print concepts and letter discrimination items were multiple-choice items in which children were shown a page with four pictures and asked to point to the picture that had letters or that could be read. Word discrimination items were multiple-choice items in which children were shown a page with four pictures and asked to point to the one that could be read. Letter-name and letter-sound knowledge items included both multiple-choice and free-response items in which a child was either asked to point to a letter corresponding to the name or sound spoken by the examiner or to name or provide the sound associated with a letter displayed on a page. Both English and Spanish versions of the Print Knowledge subtest contained 36 items (four print concept, letter discrimination, and word discrimination items, 16 letter knowledge items, and eight letter-sound correspondence items). Internal consistency reliability was moderate to high for both languages (English alpha = .93, Spanish alpha = .88).

Procedure

Informed consent was obtained from parents of participants prior to participation in the study. Children were administered the P-CTOPPP in both English and Spanish both before and after implementation of the intervention at the beginning (October/November) and end (May/June) of the preschool year. The assessments were administered by bilingual graduate and undergraduate research assistants who were trained in the administration of the P-CTOPPP. These research assistants were not involved in the implementation of the intervention, and they had no knowledge of the intervention conditions to which children were assigned. Administration of the assessments was counterbalanced by language and was done over two days for each participant, with each session lasting approximately 20 - 30 minutes. Children were spoken to in the language of the test being administered and were reminded of which language to use if they responded in the other language. Responses were only coded as correct if they were given in the language being assessed.

Intervention

Children were randomly assigned to one of three intervention conditions. One condition was a business-as-usual control condition in which children received only their classroom curriculum (High/Scope Curriculum). The High/Scope Curriculum takes an approach called "active participatory learning" in which children build knowledge through a learning experience that involves direct interactions with people and objects (www.highscope.org). Milestones children achieve through this curriculum are aligned with state standards and teachers use a consistent daily routine and planned environment to deliver instruction. Children are provided the opportunity to make plans on their own and later reflect upon what happened.

The other two conditions involved small-group pull-out instruction in oral language, phonological awareness, and print knowledge that used the activities of the Literacy Express Preschool Curriculum (Lonigan, Clancy-Menchetti, Phillips, McDowell, & Farver, 2005; Lonigan, Farver, Phillips, & Clancy-Menchetti, 2011); children in these conditions also received their classroom curriculum. To improve children's oral language skills, small-group instruction involved dialogic reading. The dialogic reading techniques involved shared book reading between adults and children in which adults asked children open-ended questions throughout the reading of the book to encourage children to "tell the story" on their own. Questions were initially simple and focused on the pictures in the book. As children's language skills and familiarity with the book improved, questions became more complex, requiring children to describe how pictures and other elements of the book related to each other and to other literary elements, such as plot. To improve children's PA skills, small-group activities focused on word games using pictures to help children better understand that words are made up of individual units of sound. Instruction initially focused on large units of sound, and progressed to smaller units of sound over the course of the preschool year. To improve children's print knowledge skills, activities were primarily centered on improving children's knowledge of the alphabet. These activities initially involved recognition of the letters in the children's names and gradually moved to introduce the names of all letters as well as the sounds that correspond to letters.

The intervention lasted 21 weeks. Children participated in the small-group sessions four times each week. Each daily session lasted approximately 20 minutes. All small-group intervention activities were conducted by four bilingual graduate research assistants. Children in one of the intervention conditions received the small-group pull-out instruction in English only (English-only condition). Children in the other intervention condition (transitional condition) received instruction in Spanish for the first nine weeks of the intervention. At that point, instruction was transitioned to English. Over a period of 3 - 4 weeks, each lesson previously given in Spanish was reviewed and delivered in English. After that point, children in the transitional condition only received instruction in English.

Fidelity of intervention implementation—Throughout the intervention, session attendance logs were kept for children in both intervention conditions, and classroom attendance records were obtained for children in the control condition. Children in both the English-only and the transitional conditions were present for 86% of all sessions. Children in the control condition had an attendance rate of 87%. Each week, interventionist's small-group sessions were observed and rated by the intervention supervisor using a 5-point scale of fidelity of implementation (e.g., activities conducted in prescribed manner, content of session, pacing; 1 = low fidelity, 5 = high fidelity). Across interventionists, 90 - 98% of the rated sessions received a score of 5, indicating that the intervention was provided to children as intended.

Results

Descriptive statistics for both the intervention and control conditions at pretest and posttest are shown in Tables 1 and 2, respectively. To provide a basis for comparison of this sample to other samples, responses on the P-CTOPPP were converted to TOPEL scores. Children's scores were in the low-average to below-average range on the Definitional Vocabulary (M = 77.88; SD = 17.01), PA (M = 80.96; SD = 11.44), and Print Knowledge (M = 90.46; SD = 10.32) subtest equivalents of the TOPEL at pretest. Zero-order correlations within skill, both within and across languages and time points are shown in Table 3. English and Spanish Print Knowledge skills were correlated within language, across time points, and across languages. Similarly, English and Spanish PA measures were correlated within language as well as across languages both within and across time points. Receptive and Definitional Vocabulary skills were significantly correlated within languages. English Receptive Vocabulary skills at pretest and at posttest were significantly correlated with Spanish Receptive Vocabulary skills at posttest but not Spanish Receptive Vocabulary skills at pretest.

Regression analyses were used to examine whether skills in one language at pretest moderated the impact of the intervention on the measure of the same construct in the other language at posttest in two separate intervention condition contrasts (i.e., English-only intervention condition versus control condition; transitional intervention condition versus control condition). Because vocabulary knowledge, PA, and print knowledge are distinct skills, analyses were conducted for each outcome separately. Analyses examined both L1 to L2 transfer and L2 to L1 transfer. In these analyses, multiple regression models were conducted with three steps. For the analyses examining L1 to L2 transfer, the first step included the main effect of intervention condition as well as both L1 and L2 pretest skills. In the second step, an intervention-condition-by-initial-L1-skill interaction term was added to the models. In the third step, an intervention-condition-by-initial-L2-skill interaction term was added to the models. For the analyses examining L2 to L1 transfer, the first step included the main effect of intervention condition as well as both L1 and L2 pretest skills. In the second step, an intervention-condition-by-initial-L2-skill interaction term was added to the models. In the third step, an intervention-condition-by-initial-L1-skill interaction term was added to the models. Significant interactions were probed by evaluating the simple effects of intervention condition at one SD above and one SD below the mean of the moderator (Cohen & Cohen, 1983). All continuous variables included in regressions were mean centered prior to analyses.

English-Only Intervention Condition Contrasts

English-language outcomes—Results for the analyses that contrasted the English-only intervention condition and the control condition are shown in Table 4. All initial skills measured in English were significant unique predictors of English-language posttest scores, whereas only initial-Spanish scores for Blending and Print Knowledge measures were significant unique predictors of posttest skills measured in English. Consistent with the previously reported impact analysis (Farver et al., 2009), there was a significant main effect of intervention condition such that children exposed to the intervention scored higher than did children in the control condition on all English-language outcomes. In the second step of the regressions, there were significant moderation effects for both initial-Spanish Receptive Vocabulary and initial-Spanish Elision scores. In the third step of the regressions, none of the initial-English skill interaction terms were significant; however, the addition of the initial-English-Elision interaction term caused the initial-Spanish-Elision interaction term to become non-significant, suggesting that children transferred a CUP about PA that was not language specific. In contrast, when the initial-English-Receptive-Vocabulary interaction term was added to the model, the initial-Spanish-Receptive-Vocabulary interaction term

remained a significant unique predictor, suggesting that children transferred specific linguistic information across languages, supporting a CUP-independent DIH.

Results of analyses probing the significant interactions are shown in Figure 1. For both the Receptive Vocabulary and Elision outcomes, the simple effects of the intervention were significant at high levels of initial Spanish skill but not at low levels of initial skill (high Receptive Vocabulary: $\beta = .41$, $p < .01$; low Receptive Vocabulary: $\beta = .01$, $p = .97$; high Elision: $\beta = .50$, $p < .001$ low Elision: $\beta = .10$, $p = .38$).

Spanish-language outcomes—As shown in Table 4, there were significant main effects of all initial Spanish skills on Spanish-language outcomes. There were no significant main effects of initial English skills or intervention condition on Spanish-language outcomes. No intervention-condition-by-initial-English-skill interaction term significantly predicted Spanish-language outcomes in step 2 of the regression, and no intervention-condition-by-initial-Spanish-skill interaction term significantly predicted Spanish-language outcomes in step 3 of the regressions.

Transitional Intervention Condition Contrasts

English-language outcomes—Results of the analyses that contrasted the transitional intervention and the control conditions are shown in Table 5. All initial skills measured in English were significant unique predictors of their respective English skills at posttest. Initial Spanish Blending and Spanish Print Knowledge scores were significant unique predictors of English Blending and English Print Knowledge at posttest, respectively. Additionally, all main effects of intervention condition significantly predicted English-language outcomes such that children in the transitional intervention condition had higher posttest scores than did children in the control condition for all English-language outcomes. None of the interaction terms involving initial-Spanish skills added in the second step of the regression significantly predicted children's English-language outcomes. When the intervention-condition-by-initial-English-skill interaction terms were added in the third step of the regression, children's initial English Blending skills moderated the effect of the intervention for English Blending outcomes.

Results of the analysis probing the significant Blending interaction are shown in Figure 2. At high levels of initial English Blending skills, the simple effect of intervention condition was not significant ($\beta = .06$, $p = .61$). At low levels of initial English Blending skills, the simple effect of intervention condition was significant ($\beta = .47$, $p < .001$).

Spanish-language outcomes—As shown in Table 5, all initial skills measured in Spanish were significant unique predictors of their respective Spanish skills at posttest. In addition, all main effects of intervention condition significantly predicted children's Spanish-language outcomes such that children in the transitional intervention condition had higher Spanish-language skills at posttest than did children in the control condition. When the intervention-condition-by-initial-English-skill interaction terms were added to the models in the second step of the regression, there were significant moderating effects of both initial-English Definitional Vocabulary and initial-English Elision skills. When the intervention-condition-by-initial-Spanish-skill interaction terms were added to the models in the third step of the regression, there was a significant moderating effect of initial-Spanish Elision skills on Spanish Elision outcomes. Both of the significant interactions from the second step remained significant when tested in the context of the interaction terms added in the third step, suggesting that children transferred specific linguistic information across languages for Definitional Vocabulary, supporting a CUP-independent DIH, and both

specific and common linguistic information across languages for Elision, supporting both a CUP-independent DIH and a CUP model.

Results of analyses probing the significant interactions are shown in Figure 3. For Definitional Vocabulary, the simple effect of intervention condition was significant at high initial levels of English Definitional Vocabulary ($\beta = .31$, $p < .001$) but not at low initial levels of Definitional Vocabulary ($\beta = .04$, $p = .62$). Similarly, the simple effect of intervention condition was significant at high initial levels of English Elision ($\beta = .60$, $p < .001$) but not at low initial levels of Elision ($\beta = .01$, $p = .92$). Results probing the significant interaction of Spanish Elision skills are shown in Figure 4. At high initial levels of Spanish Elision skills, the simple effect of intervention condition was significant ($\beta = .57$, $p < .001$). At low initial levels of Spanish Elision skills, the simple effect of intervention condition was not significant ($\beta = .02$, $p = .87$).

Discussion

In this study, we evaluated the presence and type of transfer of emergent literacy skills from one language to another for Spanish-speaking LM preschool children. Beyond findings of co-occurrence of skills in L1 and L2, which are the data typically taken to demonstrate that transfer has occurred, we evaluated whether children's skills in one language would facilitate gains in the other language when exposed to an effective intervention. That is, this study addressed the question of whether providing the context in which transfer could occur (i.e., an effective intervention) did it occur? Overall, the results of the study suggest a limited role of transfer in the development of emergent literacy skills for Spanish-speaking preschool LM children. We reasoned that if transfer from L1 to L2 (or vice versa) occurred, children with more skills in one language would show greater gains in the other language as a result of the intervention than children with less skills in that language because they would have more skills that they were capable of transferring across languages. Furthermore, this study addressed whether these effects represented transfer of specific linguistic information (a CUP-independent DIH) across languages or represented language-independent transfer (i.e., CUP). We reasoned that for language-independent skills such as PA, a CUP across languages would account for cross-linguistic relations, and that for language-dependent skills such as vocabulary and print knowledge, transfer of specific linguistic information across languages would occur. Results provided partial support for these predictions for vocabulary and PA.

In contrast to most prior studies that have attempted to study transfer of skills in samples of LM children, which have used correlational analyses (e.g., Leafstedt & Gerber, 2005; Lopez & Greenfield, 2004; Tabors et al., 2003), this study evaluated transfer in the context of an experimental study of an effective intervention (Farver et al., 2009). A significant positive correlation between a skill in L1 and L2 does not provide strong evidence of transfer because the source of the positive correlation could be due to multiple possible factors, of which transfer is just one. For instance, a positive correlation could be the result of common strong or weak learning environments for the skill in both L1 and L2. Alternatively, a positive correlation could reflect the degree to which children's general cognitive abilities facilitate acquisition of the skill in both L1 and L2. By experimentally manipulating instruction in this study, we were able to examine the degree to which ability level in L1 influenced learning in L2. Additionally, although most prior research has considered only the possibility of L1 to L2 transfer, there is no reason to expect that emergent literacy skills cannot also transfer from L2 to L1 (Dressler & Kamil, 2005). Therefore, this study examined these relations as well.

In this study, children's print knowledge and PA were correlated across languages, but children's vocabulary, skills were generally not correlated across languages. It was expected that PA skills would be significantly correlated across languages because PA is language-independent to the extent that sounds are the same across languages. It was also expected that print knowledge would be significantly correlated across languages because although print knowledge is a language-specific skill, it is relatively similar across English and Spanish as visual representations of many letters are identical and the sounds that correspond to these letters are often the same across languages (although names for the letters differ across languages). The finding that vocabulary skills were not consistently correlated across languages was not surprising. Aside from cognates, vocabulary knowledge is language-specific. In fact, studies indicate that vocabulary knowledge for LM children is often not significantly correlated across languages (e.g., Gottardo & Mueller, 2009).

Results of this study did not support a broad role for transfer in the acquisition of emergent literacy skills. The findings demonstrated that 15 of 20 possible effects of the intervention (i.e., comparing treatment conditions to the control condition on outcomes in both languages) were significant. The only intervention effects that were not statistically significant were the effects for Spanish-language outcomes when comparing the English-only intervention condition--where there was no instruction in Spanish--to the control condition. Of the 15 significant intervention effects, only four cross-language initial-skill-by-intervention-condition interactions were significant.

Vocabulary

Results for vocabulary outcomes indicated that Spanish-speaking LM children transferred specific linguistic information about vocabulary across languages. Children with higher initial vocabulary knowledge in one language benefitted more from the intervention on vocabulary outcomes in the other language than did children with lower initial vocabulary knowledge. These children were exposed to adequate amounts of instruction in English and Spanish to allow their prior Spanish and English vocabulary knowledge to facilitate the acquisition of new vocabulary knowledge in the language of instruction. For both significant vocabulary interactions, the inclusion of a second interaction term with pretest skills in the same language as the outcome did not diminish the unique predictive value of the initial interaction term, indicating that the moderating effect was specific to children's vocabulary in the language that was different from the outcome. Because vocabulary knowledge is not a general skill but is specific knowledge of words in a child's lexicon, it appears that children are able to capitalize on this knowledge of and familiarity with words they have in one language to learn words in another language.

We hypothesized that any measure that significantly moderated the impact of the intervention for one intervention condition contrast (e.g., English-only intervention condition versus control condition) would do so in the other intervention condition contrast (e.g., transitional intervention condition versus control condition); however, this was not the pattern of results obtained. There are several possible explanations for why the findings for vocabulary measures were inconsistent with one another. Prior research has suggested that L1 and L2 oral language skills are entirely separate constructs (Gottardo & Mueller, 2009) and that L1 and L2 oral language skills are often not correlated with one another or are even negatively correlated (e.g., Tabors et al., 2003). In this study, neither Receptive Vocabulary nor Definitional Vocabulary skills were significantly correlated across languages at pretest; however, transfer effects were found despite the apparent lack of a relation between L1 and L2 vocabulary knowledge at pretest. The varying languages of instruction across intervention conditions may partially account for the inconsistent results between contrasts. Definitional vocabulary is a more complex measure than receptive vocabulary, requiring children to be able both to name objects and to describe a feature of the object. It is possible

that children in the English-only intervention condition did not have the background knowledge in Spanish about these objects necessary to demonstrate transfer of this more complex skill. Children in the transitional intervention condition were exposed to instruction designed to improve their oral language skills in both Spanish and English, facilitating the development of knowledge about objects independent of language and allowing children to transfer knowledge from one language to another. Although this may explain why children in the English-only intervention condition did not transfer definitional vocabulary skills across languages, it does not explain why children in the transitional intervention condition did not transfer receptive vocabulary skills across languages. It does not appear that the overall impact of the intervention on these skills can help explain these results, however, as overall effect sizes of the intervention for both receptive and definitional vocabulary skills were of similar magnitude for both conditions (see Tables 4 and 5, and Farver et al., 2009). Furthermore, it does not appear that zero-order correlations in this study between initial vocabulary knowledge and vocabulary knowledge at posttest can provide insight into this finding, as the cross-language, cross-time relations between receptive vocabulary skills were of similar magnitude to the cross-language, cross-time relations of definitional vocabulary skills. Although these explanations could provide insight as to how children's vocabulary skills transfer from one language to another, additional research is necessary to determine which, if any, of these explanations is most likely to explain the cross-language transfer of children's vocabulary skills.

Phonological Awareness

Children with higher initial elision skills in one language benefitted more from the intervention on elision outcomes in the other language than did children with lower initial elision skills. For the English-only versus control intervention condition comparisons, results supported language-independent transfer, whereas for the transitional versus control intervention condition comparisons, results supported both the transfer of specific linguistic information and transfer due to a CUP. We hypothesized that results for PA outcomes would support only language-independent transfer (i.e., transfer due to a CUP). Although there is no clear explanation for these inconsistent findings, the varying results could be an artifact of differing languages of instruction across intervention conditions (i.e., children in the transitional condition received instruction in both English and Spanish). Children in the transitional intervention condition benefitted from a CUP and transferred specific linguistic information across languages for Spanish outcomes. It was expected that children would be able to utilize their CUP across languages to transfer knowledge about PA from English to Spanish and vice versa; however, this was not what the results indicated. It is unclear why children who received instruction in both Spanish and English would transfer information about PA to Spanish, but not to English.

These results indicated that the high correlations between PA measured in Spanish and PA measured in English found in some studies (e.g., Dickenson et al., 2004; Lopez & Greenfield, 2004; Tabors et al., 2003) may not represent the result of the transfer of Spanish PA skills to English PA skills. Rather, such correlations may reflect the development of an underlying PA ability that is not language dependent. The results of Branum-Martin and colleagues (2006), however, indicated that there were components of PA that were unique to each language. That is, they found that PA measured in English and PA measured in Spanish was best represented as distinct factors, despite a high correlation between the two factors.

In their Lexical Restructuring Model (LRM), Metsala and Walley (1998) proposed that as children's vocabularies grow, their mental representation of words undergoes restructuring from a holistic form to a more fine-grained, segmented form of words. The LRM, along with the General Abilities Model of transfer (Castilla et al., 2009) and the notion of a CUP (Cummins, 1981) can help merge the results of this study with the findings of Branum-

Martin and colleagues (2006) that there are components of PA that are unique to each language. Lexical restructuring occurs at the local level (i.e., only for words that a child knows). As this shift in children's mental representation of words takes place, they have better access to component parts of words. With this increased access comes the possibility of the development of PA skills. Some of this knowledge about the sounds of words is language independent and children are able to detect and manipulate the word sounds of both of their languages, as evidenced by this study's partial support for language-independent transfer. Additionally, a recent study suggested that receptive vocabulary skills among LM children moderated the relation between L1 and L2 PA skills, such that correlations between L1 and L2 PA skills were lower for children with lower L1 receptive vocabulary than for children with higher L1 receptive vocabulary (Atwill, Blanchard, Christie, Gorin, & García, 2010). This finding provides further support for the theory that some knowledge of the sounds of words is language independent; however, some of this knowledge about the sounds of words is specific to those words that resulted in lexical restructuring and does not lead to increased PA skills in another language, as evidenced by the finding that there are components of PA that are unique to each language (Branum-Martin et al., 2006) and this study's partial support for transfer of specific linguistic information.

Because both elision and blending are presumably measures of the same underlying PA construct, it was expected that if cross-language transfer effects were found for elision skills they would also be found for blending skills; however, this was not the case. Elision is a more difficult task than is blending for preschool children (Anthony et al., 2011; Lonigan, Burgess, Anthony, & Barker, 1998). It is possible that children who had higher initial blending skills were near the ceiling of the measure and did not have as much room to show substantial improvement on the measure as did children with higher initial elision skills. Although mean scores at pretest and posttest were substantially higher for the Blending subtests than for the Elision subtests, these scores were not approaching the ceiling of the measure, ruling this out as an explanation for the lack of transfer of blending skills. The effects of the intervention were smaller overall for blending than for elision (see Tables 4 and 5; Farver et al., 2009), suggesting that there might have been a partial ceiling effect on blending.

Print Knowledge

Initial print knowledge skills in either L1 or L2 also did not moderate the impact of the intervention for any intervention-condition contrast. The Print Knowledge subtest of the P-CTOPPP is mostly knowledge of letters and letter-sound correspondence. Letters in Spanish and English are mostly the same, but they have different names and several make different sounds. This is similar to vocabulary because objects are the same across languages but are described using different words and sounds in each language. There were significant transfer effects for vocabulary knowledge but not for print knowledge. Other studies have claimed that aspects of print knowledge (e.g., letter-sound knowledge) demonstrate cross-language transfer (e.g., Lindsey et al., 2003); however, these studies simply examined cross-language correlations. The high cross-language correlations between print knowledge skills at pretest in this study (see Table 3) may indicate that cross-language transfer of print knowledge skills already occurred for these children prior to the intervention. For example, if the children in this study were already exposed to activities that increase print knowledge skills in both languages there would only have been limited information about print knowledge that these children could transfer across languages as a result of the intervention.

Limitations and Future Research

Despite the advantages of an experimental design for examining cross-language transfer, this study contained several limitations that point to potential directions for future research in the area of cross-language transfer of emergent literacy skills. First, this study had a small sample size and was relatively underpowered to detect moderation effects. Future studies that use larger samples when examining cross-language transfer of emergent literacy skills in the context of an experimental design study may uncover additional evidence of transfer. Second, these analyses did not fully address the issue of cross-language transfer, as transfer may be a phenomenon that occurs over a longer period of time than the duration of this study, and future research could make use of longitudinal designs to examine the cross-language transfer of emergent literacy skills. These results solely suggest that cross-language transfer may occur when children are exposed to activities specifically designed to improve their emergent literacy skills. To address the question of transfer in the absence of targeted instruction, a longitudinal study would be needed. Longitudinal designs could also help determine when during development cross-language transfer is most likely to occur and can help to inform instruction.

Summary and Conclusions

Results of this study supported only a limited role for the transfer of emergent literacy skills for Spanish-speaking preschool LM children. Although results of prior correlational studies have indicated that children's literacy and preliteracy skills in more than one language are interdependent, this study suggested that only certain skills transfer from one language to another. Prior correlational studies do not address whether transfer of these skills from one language to another occurs because they cannot rule out alternative explanations, such as environments that support the development of skills in both languages simultaneously. This study, which used an experimental manipulation of instruction to evaluate potential transfer of these skills, found partial evidence of language-independent transfer (i.e., transfer due to a CUP) and the transfer of specific linguistic information, depending on the outcome evaluated. This study further advances the knowledge of the relations between L1 and L2 emergent literacy skills for LM children by examining cross-language transfer of emergent literacy skills through the experimental manipulation of instruction, which is a novel method of examining this issue.

Support for the transfer of specific linguistic information as evidenced by the moderation effect of initial vocabulary knowledge (for both English-only and transitional intervention condition comparisons) and elision skills (for the transitional intervention condition comparisons) is a sort of non-traditional Matthew effect (Stanovich, 1986), or a “Mateo effect.” Matthew effects imply that children who need instruction the least are able to benefit from it the most (i.e., the rich get richer). However, the Matthew effect presumably would not occur across languages, as children with higher initial skills in one language do not necessarily have higher initial skills in their other language, as evidenced by the typical finding that children's L1 and L2 vocabulary knowledge are not correlated or are negatively correlated with one another. The finding that this effect does occur across languages is unique to this study.

The significant moderation effects of elision skills (for the English-only intervention condition comparison) that partially supported language-independent transfer represent a more traditional version of the Matthew effect, in which children with greater underlying ability in one language benefit from instruction in that language to a greater extent than will children with less underlying ability. Differences in task demands can account for the varying results seen for vocabulary knowledge and PA skills. PA tasks are skill-based and require children to manipulate the individual sound components of words, whereas

vocabulary assessments are not general skill-based tasks; rather, they draw upon knowledge of specific words. For vocabulary knowledge, children learn new words that they may already know in their other language. Children can then capitalize on their conceptual knowledge of vocabulary (i.e., specific-language-independent vocabulary knowledge; Bedore, Peña, García, & Cortez, 2005) and apply it to their L2. For PA skills, children simply build on a foundation of knowledge about what PA is generally, rather than build on knowledge that is specific to one language (as is the case with vocabulary), and apply this concept to increasingly difficult tasks. This pattern of results was obtained for the English-only intervention condition comparisons but not for the transitional intervention condition comparisons, suggesting that language of instruction may play a role in the transfer of specific linguistic information across languages.

Acknowledgments

This research was supported by a grant from the National Science Foundation (REC-0128970). Preparation of this work was supported by grants from the National Institute of Child Health and Human Development (HD060292) and the Institute of Education Sciences (R305B090021). The views expressed herein are those of the authors and have not been reviewed or approved by the granting agencies.

References

Anthony JL, Solari EJ, Williams JM, Schoger KD, Zhang Z, Branum-Martin L, Francis DJ. Development of bilingual phonological awareness in Spanish-speaking English language learners: The roles of vocabulary, letter knowledge, and prior phonological awareness. Scientific Studies of Reading. 2009; 13:535–564.

Anthony JL, Williams JM, Durán LK, Gillam SL, Liang L, Aghara R, Swank PR, Assel MA, Landry SH. Spanish phonological awareness: Dimensionality and sequence of development during the preschool and kindergarten years. Journal of Educational Psychology. 2011; 103:857–876.

Atwill K, Blanchard J, Christie, Gorin JS, García HS. English-language learners: Implications of limited vocabulary for cross-language transfer of phonemic awareness with Kindergarteners. Journal of Hispanic Higher Education. 2010; 9:104–129.

Atwill K, Blanchard J, Gorin JS, Burstein K. Receptive vocabulary and cross-language transfer of phonemic awareness in Kindergarten children. Journal of Educational Research. 2007; 100:336–346.

Bedore L, Peña E, García M, Cortez C. Conceptual versus monolingual scoring: When does it make a difference? Language, Speech, & Hearing Services in Schools. 2005; 36:188–200.

Branum-Martin L, Mehta PD, Fletcher JM, Carlson CD, Ortiz A, Carlo M, Francis DJ. Bilingual phonological awareness: Multilevel construct validation among Spanish-speaking kindergarteners in transitional bilingual education classrooms. Journal of Educational Psychology. 2006; 98:170–181.

Castilla AP, Restrepo MA, Perez-Leroux AT. Individual differences and language interdependence: A study of sequential bilingual development in Spanish-English preschool children. International Journal of Bilingual Education and Bilingualism. 2009; 12:565–580.

Cohen, J.; Cohen, P. Applied multiple regression/correlation analysis for the behavioral sciences. 2nd. Hillsdale, NJ: Erlbaum; 1983.

Cummins J. Linguistic interdependence and the educational development of bilingual children. Review of Educational Research. 1979; 49:222–251.

Cummins, J. The role of primary language development in promoting educational success for language minority students. In: California State Department of Education. , editor. Schooling and language minority students: A theoretical framework. Evaluation, Dissemination, and Assessment Center, California State University; Los Angeles: 1981. p. 3-49.

Cummins, J. Interdependence of first- and second-language proficiency in bilingual children. In: Bialystok, E., editor. Language processing in bilingual children. Cambridge: Cambridge University Press; 1991. p. 70-89.

Cummins, J. Teaching for transfer: Challenging the two solitudes assumption in bilingual education. In: Cummins, J.; Hornberger, NH., editors. Encyclopedia of Language and Education. 2nd. Vol. 5. New York: Springer Science + Business Media LLC; 2008. p. 65-75.Bilingual Education

Cummins, J.; Swain, M.; Nakajima, K.; Handscombe, J.; Green, D.; Tran, C. Linguistic interdependence among Japanese and Vietnamese immigrant students. In: Rivera, C., editor. Communicate competence approaches to language proficiency assessment: research and application. Clevedon, England: Multilingual Matters; 1984. p. 60-81.

Dickinson DK, McCabe A, Clark-Chiarelli N, Wolf A. Cross-language transfer of phonological awareness in low-income Spanish and English bilingual preschool children. Applied Psycholinguistics. 2004; 25:323–347.

Dressler, C.; Kamil, M. First- and second-language literacy. In: August, D.; Shanahan, T., editors. Developing literacy in second-language learners Report of the National Literacy Panel on Language-Minority Children and Youth. Lawrence Erlbaum Associates Publishers; Mahwah, NJ: 2006. p. 197-238.

Farver JM, Lonigan CJ, Eppe S. Effective early literacy skill development for young Spanish-speaking English language learners: An experimental study of two methods. Child Development. 2009; 80:703–719. [PubMed: 19489898]

Fitzgerald J. English-as-a-second-language learners' cognitive reading processes: A review of research in the United States. Review of Educational Research. 1995; 65:145–190.

Gottardo A. The relationship between language and reading skills in bilingual Spanish-English speakers. Topics in Language Disorders. 2002; 22:46–90.

Gottardo A, Mueller J. Are first- and second-language factors related in predicting second-language reading comprehension? A study of Spanish-speaking children acquiring English as a second language from first to second grade. Journal of Educational Psychology. 2009; 101:330–334.

Hemphill, FC.; Vanneman, A.; Rahman, T. Achievement gaps: How Hispanic and White students in public schools perform in mathematics and reading on the National Assessment of Educational Progress [Statistical Analysis Report]. National Assessment of Educational Progress (NAEP); 2011.

Leafstedt JM, Gerber MM. Crossover of phonological processing skills: A study of Spanish-speaking students in two instructional settings. Remedial and Special Education. 2005; 26:226–235.

Lindsey KA, Manis FR, Bailey CE. Prediction of first-grade reading in Spanish-speaking English-language learners. Journal of Educational Psychology. 2003; 95:482–494.

Lonigan CJ, Burgess SR, Anthony JL, Barker TA. Development of phonological sensitivity in two- to five-year old children. Journal of Educational Psychology. 1998; 90:294–311.

Lonigan, CJ.; Clancy-Menchetti, J.; Phillips, BM.; McDowell, K.; Farver, JM. Literacy express: A preschool curriculum. Tallahassee, FL: Literacy Express; 2005.

Lonigan, CJ.; Farver, JM.; Eppe, S. Preschool comprehensive test of phonological & print processing: Spanish version (P-CTOPPP-S). Tallahassee, FL: Author; 2002.

Lonigan CJ, Farver JM, Phillips BM, Clancy-Menchetti J. Promoting the development of preschool children's emergent literacy skills: A randomized evaluation of a literacy-focused curriculum and two professional development models. Reading & Writing. 2011; 24:305–337.

Lonigan, CJ.; Schatschneider, C.; Westberg, L. National Early Literacy Panel, Developing early literacy: Report of the National Early Literacy Panel. Washington, DC: National Institute for Literacy; 2008. Impact of code-focused interventions on young children's early literacy skills; p. 107-151.

Lonigan, CJ.; Wagner, RK.; Torgesen, JK.; Rashotte, CA. Preschool Comprehensive Test of Phonological & Print Processing. Tallahassee, FL: Author; 2002.

Lonigan, CJ.; Wagner, RK.; Torgesen, JK.; Rashotte, CA. Test of Preschool Early Literacy. Austin, TX: ProEd; 2007.

Lopez LM, Greenfield DB. The cross-language transfer of phonological skills of hispanic head start children. Bilingual Research Journal. 2004; 28:1–18.

Manis FR, Lindsey KA, Bailey CE. Development of reading in grades K-2 in Spanish-speaking English-language learners. Learning Disabilities Research & Practice. 2004; 19:214–224.

Metsala, JL.; Walley, AC. Spoken vocabulary growth and the segmental restructuring of lexical representations: Precursors to phonemic awareness and early reading ability. In: Metsala, JL.; Ehri, LC., editors. Word recognition in beginning literacy. Mahwah, NJ: Lawrence Erlbaum Associates, Inc; 1998. p. 89-120.

Stanovich KE. Matthew effects in reading: Some consequences of individual differences in the acquisition of literacy. Reading Research Quarterly. 1986; 21:360–406.

Tabors PO, Páez M, Lopez LM. Dual language abilities of bilingual four-year olds: Initial findings from the early childhood study of language and literacy development of Spanish-speaking children. NABE Journal of Research and Practice. 2003; 1:70–91.

U. S. Census Bureau. Language use in the United States: (2007). 2007. Retrieved November 29, 2012, from http://www.census.gov/hhes/socdemo/language/data/acs/appendix.html

U. S. Census Bureau. The Hispanic population in the United States: (2011). 2011. Retrieved November 29, 2012, from http://www.census.gov/population/hispanic/data/2011.html

Wagner RK, Torgesen JK, Rashotte CA. Development of reading-related phonological processing abilities: New evidence of bidirectional causality from a latent variable longitudinal study. Developmental Psychology. 1994; 30:73–87.

Wagner RK, Torgesen JK, Rashotte CA, Hecht SA, Barker TA, Burgess SR, Donahue J, Garon T. Changing relations between phonological processing abilities and word-level reading as children develop from beginning to skilled readers: A 5-year longitudinal study. Developmental Psychology. 1997; 33:468–479. [PubMed: 9149925]

Whitehurst GJ, Lonigan CJ. Child development and emergent literacy. Child Development. 1998; 69:848–872. [PubMed: 9680688]

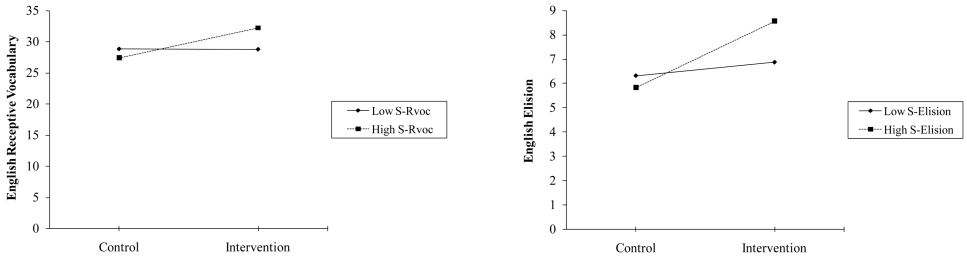

Figure 1.

Adjusted Posttest Scores for English Receptive Vocabulary (Figure 1a) and English Elision (Figure 1b) Outcomes for Children with Varying Levels of Initial Skill on Spanish Receptive Vocabulary (S-Rvoc; Figure 1a) and Spanish Elision (S-Elision; Figure 1b) Measure for English-only Intervention Condition Comparison.

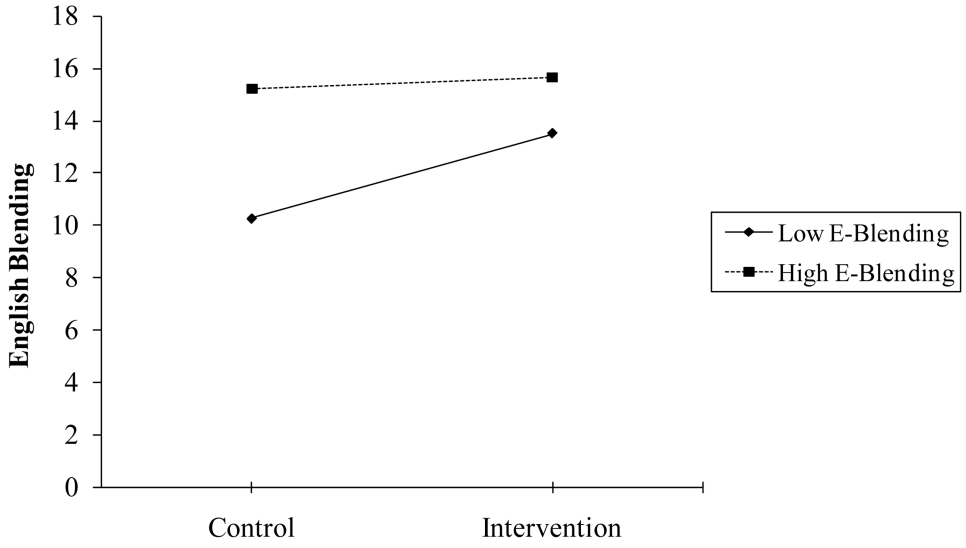

Figure 2.

Adjusted Posttest Scores for English Blending Outcomes for Children with Varying Levels of Initial Skill on English Blending Measure (E-Blending) for Transitional Intervention Condition Comparison.

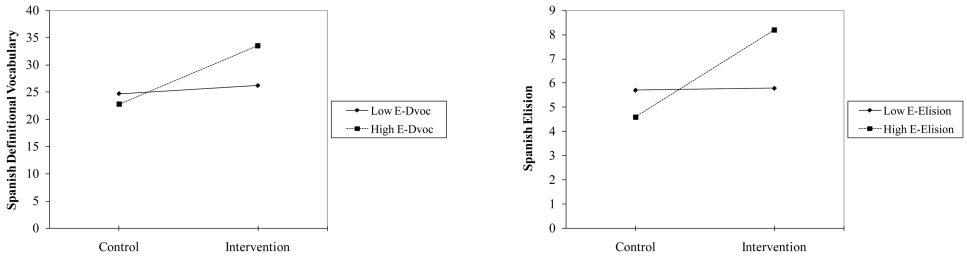

Figure 3. Adjusted Posttest Scores for Spanish Definitional Vocabulary (Figure 3a) and Elision (Figure 3b) Outcomes for Children with Varying Levels of Initial Skill on English Definitional Vocabulary (E-DV; Figure 3a) and Elision (E-Elision; Figure 3b) for Transitional Intervention Condition Comparison

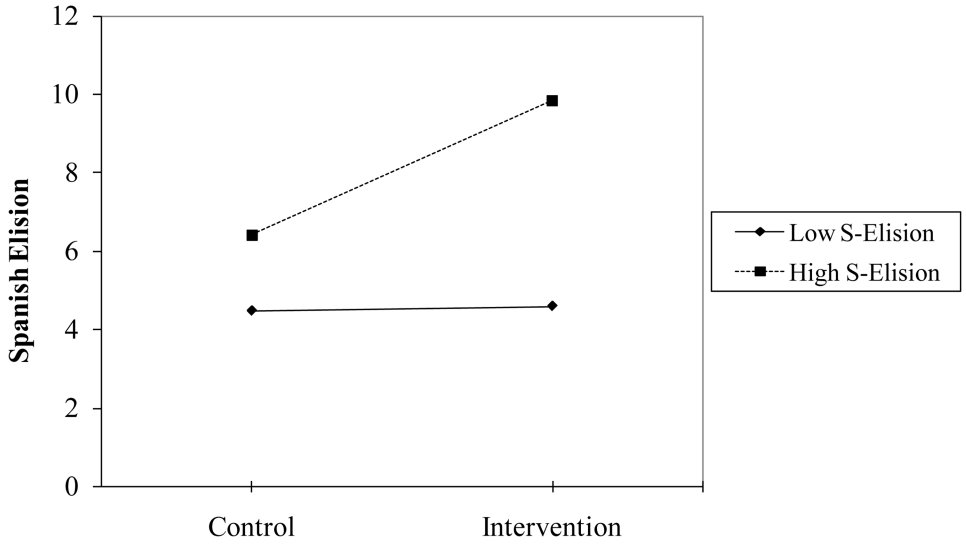

Figure 4.
Adjusted Posttest Scores for Spanish Elision Outcomes for Children with Varying Levels of Initial Skill on Spanish Elision Measure (S-Elision) for Transitional Intervention Condition Comparison.

Table 1

Descriptive Statistics for Control and Intervention Conditions on Emergent Literacy Skills in Both English and Spanish at Pretest

		Intervention Conditions		
Outcome	**Min-Max Possible**	**Control Adj. Mean (*SD*)**	**English-Only Adj. Mean (*SD*)**	**Transitional Adj. Mean (*SD*)**
Child Age (months)		54.41 (5.56)	54.00 (4.19)	55.26 (3.78)
English Measures				
Receptive Vocabulary	0-40	22.63 (6.26)	23.41 (7.33)	24.32 (5.45)
Definitional Vocabulary	0-80	26.78 (17.28)	30.08 (18.00)	35.69 (13.22)
Blending	0-21	9.62 (3.36)	9.71 (4.34)	10.10 (4.22)
Elision	0-18	4.23 (1.91)	5.29 (2.72)	5.36 (2.89)
Print Knowledge	0-36	10.29 (6.84)	11.52 (6.99)	13.68 (6.02)
Spanish Measures				
Receptive Vocabulary	0-40	21.80 (5.34)	20.26 (4.47)	19.53 (6.67)
Definitional Vocabulary	0-80	17.91 (14.61)	22.87 (17.34)	17.76 (15.99)
Blending	0-18	8.26 (3.09)	8.22 (2.98)	8.40 (4.19)
Elision	0-18	3.66 (1.73)	4.27 (2.14)	3.38 (1.77)
Print Knowledge	0-36	7.99 (5.50)	9.99 (5.80)	10.55 (7.86)

Note. Adj. Mean = scores adjusted for chronological age.

N = 94.

Table 2

Descriptive Statistics for Control and Intervention Conditions on Emergent Literacy Skills in Both English and Spanish at Posttest

Outcome	Min-Max Possible	Intervention Conditions		
		Control Adj. Mean (*SD*)	English-Only Adj. Mean (*SD*)	Transitional Adj. Mean (*SD*)
English Measures				
Receptive Vocabulary	0-40	28.33 (5.63)	30.62 (5.85)	31.79 (3.95)
Definitional Vocabulary	0-80	41.23 (16.85)	47.45 (12.96)	52.28 (12.07)
Blending	0-21	12.69 (3.51)	14.31 (3.33)	14.43 (3.04)
Elision	0-18	6.37 (1.51)	7.96 (3.24)	8.04 (3.51)
Print Knowledge	0-36	16.61 (7.96)	20.11 (9.01)	23.90 (7.56)
Spanish Measures				
Receptive Vocabulary	0-40	23.79 (4.03)	24.58 (4.07)	27.03 (5.74)
Definitional Vocabulary	0-80	25.74 (15.97)	25.90 (19.30)	32.66 (18.30)
Blending	0-18	10.59 (3.02)	11.13 (2.49)	12.71 (4.06)
Elision	0-18	5.52 (1.32)	5.94 (1.75)	7.40 (2.95)
Print Knowledge	0-36	12.83 (6.28)	13.14 (6.62)	16.54 (8.90)

Note. Adj. Mean = scores adjusted for chronological age.

N = 94.

Table 3

Correlations among emergent literacy skills between languages within and across observations

Measures	English Pretest -English Posttest	Spanish Pretest -Spanish Posttest	English Pretest - Spanish Pretest	English Posttest - Spanish Posttest	English Pretest -Spanish Posttest	Spanish Pretest - English Posttest
Receptive Vocabulary	.67**	.71**	.12	.23*	.21*	.08
Definitional Vocabulary	.81**	.91**	−.02	.16	.06	.08
Elision	.72**	.54**	.35**	.52**	.43**	.31**
Blending	.64**	.70**	.39**	.46**	.24*	.49**
Print Knowledge	.81**	.83**	.70**	.73**	.65**	.67**

Note. $N = 94$.

** $p < .01$;

* $p < .05$.

Table 4

Standardized regression coefficients from final models and change in R-squared for pretest main effects and interaction terms for the English-only vs. control condition comparisons

	Outcomes									
	RV		DV		Elision		Blending		PK	
Predictor Variables	**ΔR^2**	**B**	**ΔR^2**	**B**	**ΔR^2**	**B**	**ΔR^2**	**B**	**ΔR^2**	**B**
	English-Language Outcomes									
Step 1	.49***		.65***		.59***		.52***		.75***	
Intervention Condition		.20*		.19*		.30**		.23*		.17*
English Pretest		.67***		.77***		.53***		.61***		.62***
Spanish Pretest		.08		.11		.11		.21*		.28**
Step 2	.04*		.00		.04*		.01		.00	
Condition×S-Pretest		.21*		−.01		.16		−.07		−.06
Step 3	.00		.00		.01		.01		.00	
Condition×E-Pretest		−.05		−.04		.08		−.11		.04
	Spanish-Language Outcomes									
Step 1	.61***		.91***		.42***		.47***		.68***	
Intervention Condition		.09		.00		.17		.10		.03
Spanish Pretest		.77***		.95***		.52***		.66***		.77***
English Pretest		.08		.00		.12		.01		.08
Step 2	.00		.00		.02		.00		.00	
Condition×E-Pretest		.06		.05		.20		.07		.14
Step 3	.00		.00		.02		.02		.02	
Condition×S-Pretest		−.02		.02		−.16		−.16		−.17

Note. RV = Receptive Vocabulary. DV = Definitional Vocabulary. PK = Print Knowledge. E-Pretest = English Pretest. S-Pretest = Spanish Pretest.

$N = 63$.

* = $p < .05$.

** = $p < .01$.

*** = $p < .001$.

Table 5

Standardized regression coefficients from final models and change in R-squared for pretest main effects and interaction terms for the transitional vs. control condition comparisons

	Outcomes									
	RV		DV		Elision		Blending		PK	
Predictor Variables	**ΔR^2**	**B**	**ΔR^2**	**B**	**ΔR^2**	**B**	**ΔR^2**	**B**	**ΔR^2**	**B**
	English-Language Outcomes									
Step 1	.55***		.74***		.59***		.57***		.82***	
Intervention Condition		.34***		.31***		.30**		.27**		.38***
English Pretest		.61***		.73***		.58***		.52***		.56***
Spanish Pretest		−.05		.07		.00		.36***		.25**
Step 2	.01		.00		.01		.00		.01	
Condition×S-Pretest		.12		−.03		.05		.02		−.13
Step 3	.00		.00		.02		.03*		.00	
Condition×E-Pretest		−.07		.06		.14		−.20*		.04
	Spanish-Language Outcomes									
Step 1	.63***		.82***		.52***		.62***		.78***	
Intervention Condition		.32***		.18**		.30**		.29**		.20**
Spanish Pretest		.77***		.86***		.59***		.76***		.80***
English Pretest		.08		.08		.15		−.09		.07
Step 2	.00		.02*		.07**		.00		.00	
Condition×E-Pretest		.06		.13*		.19*		−.04		.11
Step3	.00		.00		.07**		.00		.00	
Condition×S-Pretest		−.01		−.03		.27**		.02		−.10

Note. RV = Receptive Vocabulary. DV = Definitional Vocabulary. PK = Print Knowledge. E-Pretest = English Pretest. S-Pretest = Spanish Pretest.

N = 63.

* $= p < .05$.

** $= p < .01$.

*** $= p < .001$.