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Effect of a Targeted Early Literacy Intervention
for English Learners

A Dissertation submitted in partial satisfaction
of the requirements for the degree of

Doctor of Philosophy

in

Education

by

Elizabeth Michelle Arellano

June 2013

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ABSTRACT OF THE DISSERTATION

Effect of a Targeted Early Literacy Intervention
for English Learners

by

Elizabeth Michelle Arellano

Doctor of Philosophy, Graduate Program in Education
University of California, Riverside, June 2013
Dr. Michael Vanderwood, Chairperson

This study examined the effectiveness of a targeted early literacy intervention among Spanish-speaking kindergarten English Learners (ELs). Using a Response to Intervention (RtI) framework, participants were screened in English to ensure a need for additional literacy support. Selected students were then screened in Spanish, and students with established Spanish phonological awareness (PA) skills were not included to participate. Twenty students identified as ‘at-risk’ through the screening process were assigned to receive a 9-week supplemental Spanish-only intervention. Forty students *not* at-risk served as the comparison group. The effect of the intervention was examined using a Regression Discontinuity (RD) design. Results of the study revealed a significant main effect for intervention students’ PA skills in both languages. A significant main effect was also found for students’ phonics skills in Spanish, but not in English. Results further indicated that there was no significant difference between students’ growth on English vs. Spanish measures of PA and phonics. Additionally, treatment integrity was measured for half of the sessions delivered, and the data revealed that the intervention was delivered with a high degree of integrity by both interventionists (i.e., 98% and 97%). Limitations and implications are discussed.

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Effect of a Targeted Early Literacy Intervention for English Learners

The importance of literacy cannot be overemphasized. Illiteracy is correlated with a number of undesirable factors including high levels of poverty, unemployment, and deteriorating health (Kutner, Greenberg, Jin, & Paulsen, 2006). Yet, low reading achievement among school-aged students is a prevalent problem in the United States (National Assessment of Educational Progress [NAEP] 2011). In 2009, merely 34% of fourth and eighth graders scored at or above the proficient level on the reading portion of the NAEP (NAEP, 2011). In the state of California, only 25% of fourth graders and 24% percent of eighth graders are at or above the proficient level (NAEP, 2011). This includes native English speakers (NES) and over 50% of English Learners (ELs). However, ELs have lower reading outcomes as evident by the fact that only 6% of fourth grade ELs and 3% of eighth grade ELs are at or above the proficient level versus 36% and 34% of NES, respectively (NAEP, 2009).

Achievement Gap between ELs and NES

Over the past decade, the number of ELs has dramatically increased, representing an estimated 5.1 million students (National Clearinghouse for English Acquisition [NCELA], 2007). As indicated by the National Institute of Child Health and Human Development [NICHD] (2003) the percentage of ELs will continue to grow over the years, representing an estimated 40% of the total student population by 2030. Among the large numbers of ELs in the United States, Spanish speakers represent the vast majority totaling 77%-80% of the group (Zehler et al., 2003). California also has the highest percentage, an estimated 25% of students (1.4 million) enrolled in grades K-12. Approximately 85% of these ELs speak Spanish (California Department of Education [CDOE], 2007).

ELs also start significantly behind their non-EL counterparts, and this gap has been found to persist throughout their academic career (Rumberger & Gandara, 2004). According to Parish et al. (2002) there are significant differences between ELs and NES with respect to their literacy performance. Specifically, differences have been noted across grade levels (2nd-11th grade) on a standardized achievement test (i.e., Stanford Achievement Test, Version 9 [SAT-9]) during 1998-2001. In fifth grade, EL's literacy skills were comparable to those acquired by their non-EL peers in third and fourth grade. Three years later, EL's skills were equivalent to those acquired by their non-EL peers in sixth grade. In eleventh grade, ELs

were reading at the same level of their non-EL counterparts in sixth and seventh grade (Parrish et al., 2002).

Additionally, in comparison to NES, ELs do not perform as well on statewide high school exit exams (Rumberger & Gandara, 2004). While 48% of NES were found to pass the California High School Exit Exam (CHSEE) in 2004, merely 19% of ELs passed this exam after two attempts. Furthermore, Spanish speaking ELs are among those most at risk for being placed into special education, both at the elementary and secondary levels (Artiles, Rueda, Salazar, & Higareda, 2005). They are also among those most at risk for school withdrawal (National Center for Education Statistics [NCES], 2009).

Importance of Early Intervention

Due to this achievement gap and numerous risk factors, intervening among ELs is crucial. Students experiencing reading difficulties, who do not receive a form of early intervention, are likely to retain their reading deficits long term (e.g. Parrish et al., 2002). Such results have also been supported by numerous research studies in which poor readers in the early primary grades (i.e., 1st-3rd) remained poor readers in the future (i.e., 4th-9th; Juel, 1988; Felton & Wood, 1992; Francis, Shaywitz, Stuebing, Shaywitz, & Fletcher, 1996; Satz, Fletcher, Clark, & Morris, 1981). These studies indicate that children will not outgrow their reading difficulties on their own. Furthermore, these students will continue to fall behind their non-struggling peers who will ultimately grow over time (Stanovich, 1986). According to the Matthew Effect, good readers will read more than poor readers (Rayner, Foorman, Perfetti, Pesetsky, & Seldenberg, 2002; Stanovich, 1986), consequently, improving over time and widening the achievement gap between struggling and non-struggling students. As a result, these children will not develop the skills needed to become good readers (Guthrie, Schafer, & Huang, 2001).

Therefore, there is a need to examine the effect of early intervention for at-risk students, particularly for ELs. Rather than waiting for students to fail, it is best to address reading deficits as early as possible to help prevent subsequent reading failure (Ryder, Tunmer, & Greaney, 2008). In particular, early screening (e.g. kindergarten) for at-risk students should occur (Kaminski & Good, 1996) as reading deficits that are not addressed before third grade are more difficult to eliminate (Rathvon, 2004). The following discussion will focus on the research supporting the need for early intervention among ELs.

The following areas will be discussed: Response to Intervention (RtI), phonological awareness (PA), cross-language transfer of PA, and early literacy intervention research for both monolingual speakers and ELs.

Response to Intervention

In an effort to address the persistent reading problems among school-aged students, Response to Intervention (RtI) has been emphasized. RtI is a multi-tiered preventative framework that focuses on resource allocation to maximize educational outcomes. Some characteristics of RtI include instructional match, evidence-based intervention, progress monitoring, and data-based decision making. While an RtI model may have several tiers of support, it is often described in terms of a three-tiered model. In Tier 1, all students are provided with evidence-based instruction in the general education environment. Also, all students are screened to identify students who are at-risk for poor later academic outcomes. The students identified as at-risk are placed in Tier 2. These students are provided with targeted group intervention. They are also frequently monitored to determine whether they are making adequate progress toward a given goal. Students who are identified as not making sufficient progress toward a given goal are placed into Tier 3. Tier 3 consists of intensive and individualized support. An RtI approach has been shown to successfully improve the outcomes of students by decreasing the number of children eligible for special education (Torgesen, 2002).

Numerous studies have endorsed the use of such a model with a high percentage of ethnic minorities (e.g. ELs; Linan-Thomson, Cirino, & Vaughn, 2007; Rathvon, 2004). According to Brown and Doolittle (2008) ELs would likely benefit from an RtI model simply because their specific needs are considered. Additional support, for instance, is tailored to the needs of those identified as “at-risk.” If a school has a high percentage of ELs, universal screening and collaboration between educators would allow for the creation of appropriate interventions for those students. For ELs, this includes consideration of their language proficiency status, acculturation status, educational background, among other factors. This is important as it provides ELs with the opportunities needed to succeed in schools across the U.S. (Brown & Doolittle, 2008).

Role of Phonological Awareness in Reading

Although reading achievement is dependent on the acquisition of numerous early literacy skills (Adams & Henry, 1997; Juel, 1988; National Reading Panel [NRP], 2000; Torgesen, 2002), PA has been identified as the most critical predictor of early reading proficiency. PA involves skills such as rhyming, blending, segmenting, and manipulating phonemes (Adams, 1990). Deficits in PA have been identified as one of the most predominant causes of reading difficulties (Torgesen, 2002). Students who lack PA skills in the early primary grades struggle in comparison to their peers who have some level of these skills (Bravo-Valdivieso, 1995; Juel, 1988; Wagner, 1988). Additionally, PA is a crucial skill for literacy development in various languages including Spanish (Carrillo, 1994), French (Comeau, Cormier, Grandmaison, & Lacroix, 1999), and Italian (Cossu, Shankweiler, Liberman, Katz, & Tola, 1988).

Cross-Language Transfer of Phonological Awareness

In addition to the importance of PA as a critical skill for literacy development, research over the past two decades supports the cross language transfer of PA skills (Cisero & Royer, 1995; Durgunoglu, Nagy, & Hancin-Bhatt, 1993; Quiroga, Lenos-Britton, Mostafapour, Abbott, & Berninger, 2002). Specifically, the strongest transfer of these skills has been noted among languages that have similar alphabet systems (e.g. Spanish and English; Cisero & Royer, 1995; Durgunoglu et al., 1993; Quiroga et al., 2002). Cummins (1979) best describes this cross-language transfer effect by proposing that the acquisition of a second language (e.g. English) partially depends on the adequate development of a student's native language (e.g. Spanish) when the student is being exposed to the second language. In other words, Cummins suggests that highly developed native language skills results in the strong development of second language skills. For students with limited native language skills, however, exposure to a second language in the early primary grades is likely to hinder their already underdeveloped native language skills. This will negatively affect a student's second language development (Cummins, 1979).

Research examining the cross-language transfer effect of English and Spanish PA skills among ELs provides support for Cummins' (1979) *linguistic interdependence hypothesis*. A study conducted by Cisero and Royer (1995) found that first grade students' PA skills in Spanish (e.g. rhyme and phoneme identification) significantly predicted their PA skills in English. Similarly, in a study conducted by

Durgunoglu et al. (1993) Spanish PA skills among 31 first graders were strongly related to both Spanish and English word reading. PA was assessed with tasks of segmenting, blending, and matching. Specifically, students who demonstrated high levels of PA skills in Spanish were more able to read English words and English pseudo-words in comparison to their peers who had lower levels of Spanish PA skills. This finding was more apparent for pseudo-words that had different pronunciations in either language.

Dickinson, McCabe, Clark-Chiarelli, and Wolf (2004) found that PA skills for preschoolers transferred in both English and Spanish. One hundred and twenty-three bilingual preschool children attending Head Start were administered PA tasks in both languages. Results revealed that English and Spanish PA skills in the fall moderately correlated with PA skills in the spring, indicating that PA skills are fairly stable for students in the early primary grades (McCabe et al., 2004).

Another study by Lindsey, Manis, and Bailey (2003) examined the cross-language transfer effect of English and Spanish literacy skills among Spanish speaking ELs in kindergarten. Results revealed that PA transferred from Spanish to English and was predictive of word reading. Correlations between Spanish PA and Spanish word reading were also similar to the correlations between Spanish PA and English word reading, suggesting that the development of PA skills in a student's native language has the same relationship with English word reading as it does with Spanish word reading. Specifically, Spanish PA measured at the beginning and at the end of kindergarten significantly correlated with English PA at the end of first grade. A significant correlation was also found between Spanish PA and English comprehension. Interestingly, another study by these researchers (i.e., Manis, Lindsey, & Bailey, 2004) revealed that the development of PA skills in Spanish among kindergarteners was significantly related to English word reading and English comprehension two years later.

Quiroga and colleagues (2002) also demonstrated additional support for the cross-language transfer effect of PA in a study in which 30 first grade ELs completed a battery of PA assessments in both English and Spanish. Results revealed that Spanish PA predicted both Spanish and English pseudo and real word reading. Similarly, English PA predicted both English and Spanish real word reading but not pseudo word reading.

Overall, these studies highlight the importance of PA as a necessary skill for the development of early reading. PA serves as the foundation for reading development. In addition, these studies provide support for Cummins' (1979) *linguistic interdependence hypothesis* suggesting that the development of PA skills in a student's native language (e.g. Spanish) is likely to help strengthen their literacy skills in a second language (e.g. English). Assuming that ELs are more fluent in their native language, Spanish material could allow for the development of students' PA skills in their native language. Logically, students who enter school in the U.S. speaking a language other than English will struggle to understand English material. For this reason, Spanish speaking ELs may be more fluent in understanding and manipulating their own native language. This would develop their Spanish PA skills, consequently strengthening their English skills (Cummins, 1979).

This has important implications for educators as they can build on the strengths of their EL students. Interestingly, certain PA skills (e.g. rhyme, alliteration) have been found among Spanish-speaking children who have not yet received reading instruction (Carrillo, 1994). Thus, such skills could be further developed in a student's native language which could ultimately transfer to their second language (e.g., English; Herrera, Perez, & Escamilla, 2010). Students with high PA levels in Spanish are more likely to perform better on English tasks (Durgunoglu et al., 1993). Fortunately, PA can be taught explicitly beginning with children as young as four years old (Chard & Dickson, 1999).

Early Literacy Interventions

Studies with monolingual speakers. There is an extensive amount of research demonstrating the effectiveness of early literacy interventions for monolingual speakers (primarily NES), both with and without disabilities (Denton, Fletcher, Anthony, & Francis, 2006; Foorman & Torgesen, 2001; Mathes & Denton, 2002; O'Connor, Fulmer, Harty, & Bell, 2005; Ziolkowski & Goldstein, 2008). This has been documented particularly within a multi-tiered framework among students in the primary grades (i.e. K-3; Torgesen, Wagner, Rashotte, Alexander, & Conway, 1997; Torgesen, 2002; Vellutino, Scanlon, & Zhang, 2007). When provided with explicit and intensive interventions, at-risk NES have been found to significantly improve in their literacy skills.

In a review of six studies, Al Otaiba and Torgesen (2007) found support for early intervention among students in the primary grades. This review found that supplemental interventions within an RtI framework reduced the number of students requiring further literacy support. Specifically, at-risk students were reduced to approximately 1% by the end of 1st/2nd grade. Another important finding was that students maintained their initial response to the interventions. A strong response to a given intervention often led to stronger reading growth in comparison to students who did not respond as strongly. This finding was particularly true for a number of literacy skills, most especially PA.

A study conducted by Vellutino, Scanlon, and Tanzman (1998) investigated the effects of an early literacy intervention among poor readers in first grade. Poor readers and good readers were identified through teacher nomination and various assessment measures. Students identified as poor readers were randomly assigned to receive daily one-to-one tutoring for one to two semesters for 30 minutes a day. Instruction occurred in the areas of PA, word identification, phonics, and writing. Students' reading abilities were assessed through third grade. Results of this study revealed that students made considerable gains following the intervention. Sixty-seven percent of students were able to read at grade level after one semester of intensive tutoring. This led to the reduction of students who were qualifying as "disabled readers." This study shows that students with poor literacy skills can make significant improvements if a preventative model is used to identify and intervene with them as early as kindergarten and first grade.

Eight years later, Vellutino, Scanlon, Small, and Fanuele (2006) expanded upon the Vellutino et al. (1998) study. Upon entering kindergarten, 1,373 students were screened using a letter-naming task. Thirty percent were identified as at-risk, and half of these students then received small-group intervention two to three times a week. The other half of students received remedial assistance that was offered by their respective schools (i.e., school based comparison group). Intervention instruction focused on early literacy skills including PA, print awareness, letter recognition/identification, and phonics. Students who continued to have reading difficulties in the beginning of first grade continued receiving either one-to-one daily tutoring or school remedial assistance. Results revealed that both conditions, intervention and school remedial assistance, were successful in preventing reading difficulties for students most at-risk. Both this study and the previous study (i.e., Vellutino et al., 1998) suggests that at-risk children can be identified

upon entry into kindergarten. Future reading difficulties can be prevented with small group intervention in kindergarten and/or first grade. By the end of first grade further assistance is not likely be needed (Vellutino et al., 1998).

A longitudinal study conducted by Torgesen et al. (1999) provides additional support for the efficacy of early intensive intervention in PA. Students identified as poor readers in the early primary grades made significant gains in their literacy skills after receiving intensive one-to-one intervention for 88 hours. Specifically, students receiving targeted PA instruction were found to make the greatest gains. Results further revealed that most of the poor readers in first grade (lowest 10%) were able to achieve average level reading skills after the intervention.

Although the studies discussed above focused on monolingual English speakers, researchers have also examined the effects of early literacy interventions for monolingual speakers of languages other than English (e.g. French and Spanish). Dion, Brodeur, Gosselin, Campeau, and Fuchs (2010) examined the efficacy of a first grade-only intervention and a kindergarten and first grade intervention. Participants included 256 students who were mostly native French speakers. Students were assigned to one of two conditions: a first grade-only intervention or a kindergarten and first grade intervention. The kindergarten intervention focused on letter names and sounds, all conducted in French. The first-grade intervention focused on letter sounds and words. Results were analyzed separately for high-risk and low-risk students. The low-risk students benefitted from the first grade-only intervention and the kindergarten component of the combined intervention. The high-risk students benefitted from both years of the combined intervention. However, they did not benefit from the first-grade only intervention. Overall, this study found that two years of intervention was necessary for the high-risk students, but not for the low-risk students.

Cuadro, and Trías (2008) examined the effects of an early literacy intervention with 51 monolingual Spanish-speaking kindergarteners. These students were assigned to one of three groups: (1) a PA group, (2) a PA and phonics group, and (3) a control group. The PA group focused on phoneme isolation, phoneme recognition, word segmentation, word blending, word omission, and word substitution. The PA + phonics groups received the same PA instruction as the PA group in addition to explicit phonics instruction. The interventions consisted of 16 sessions, 30 minutes each, over the course of 8 weeks.

Results revealed that students in both treatment groups performed significantly better than the control group. In another study, Arnáiz Sánchez, Castejón Costa, Ruiz Jiménez, and Guirao Lavela (2002) examined the benefits of a PA focused intervention in a longitudinal study with monolingual Spanish speakers. Results indicated that a PA focused intervention improved the reading and writing skills of second grade students, with the experimental group outperforming the control group on several measures.

In the previous studies conducted with monolingual speakers, two major themes can be drawn. First, students can be screened for early literacy difficulties in kindergarten (Dion et al., 2010; Vellutino et al., 2006) or first grade (Vellutino et al., 1998). Secondly, students identified as at-risk can benefit from targeted early literacy intervention (Al Otaiba and Torgesen, 2007; Dion et al., 2010; Torgesen et al., 1999; Vellutino et al., 1998; Vellutino et al., 2006). Therefore, it is important to conduct early screening and intervention in order to maximize future reading outcomes for these students.

Studies with monolingual speakers and ELs. Although the research base for ELs is not as extensive as it is with NES, the majority of studies that have been conducted demonstrate that ELs can significantly improve in their literacy skills when provided with explicit, intensive, and systematic instruction. Such interventions produce the largest effect sizes for both NES and ELs (Wanzek & Vaughn, 2007). Furthermore, there is evidence to support that both groups of students can make greater literacy gains with early intervention (i.e., fall of kindergarten; O'Connor, Bocian, Beebe-Frankenberger, & Linklater, 2010). ELs can also attain reading levels comparable to NES when provided with high quality interventions (Lesaux & Siegel, 2003). Additionally, there is evidence to suggest that ELs acquire English literacy skills in a manner similar to NES (Chiappe, Siegel, & Wade-Woolley, 2002). The following discussion will review studies that have compared the effects of early literacy intervention among NES and ELs.

Chiappe, Siegel, and Wade-Woolley (2002) examined the effects of intervention with 858 kindergarten students with varying levels of English proficiency. Participants came from 23 different language backgrounds, with the largest linguistic groups consisting of Chinese, Farsi, Korean, Japanese, Spanish, and Tagalog. Students were screened with a rhyme detection task in kindergarten, and at-risk students were provided with intervention. The intervention consisted of small-group PA and phonics

training. Results showed that ELs and NES performed similarly on measures of letter identification, decoding, and spelling in both kindergarten and first grade. Regarding PA skills, ELs were at a disadvantage in kindergarten compared to their NES peers. However, with additional intervention ELs were able to catch up to their peers by the end of first grade.

In another study, Ashdown and Simic (2000) examined the extent to which an intervention resulted in improved outcomes for ELs in comparison to NES. Participants consisted of 55,231 first graders who were ELs or NES. Student data were retrieved from a six-year database in which the intervention had been implemented. The intervention focused on PA, phonics, spelling, comprehension, and fluency. Approximately 25,600 students received the intervention in first grade during a six-year period from 1992 to 1998. Results revealed that both ELs and NES improved in their literacy skills, performing at similar levels after receiving intervention.

Lesaux and Siegel (2003) conducted a similar study that compared the effects of early intervention for NES and ELs. The participants included students from 33 different language backgrounds who were in mainstream English classrooms. Students were followed longitudinally from kindergarten to second grade. In kindergarten, students received 20-minute sessions of small-group PA intervention three to four times per week. In first grade, students received phonics instruction with some also continuing to receive PA instruction. The results found that by the end of second grade, ELs performed the same as or better than NES on various measures of reading skills. This suggests that ELs benefit from early intervention possibly more than NES. Both groups were found to have similar courses of reading development. This study also highlights the importance of PA because phonological processing was found to be the single best predictor of second grade word reading and comprehension for ELs.

In another longitudinal study, Lovett and colleagues (2008) also investigated the effects of a PA intervention among 166 reading disabled ELs and NES. Participating ELs came from various language backgrounds, including Portuguese, Spanish, and Tagalog. All students were followed from second to eighth grade. Students randomly selected for treatment received one hour of daily instruction, weekly, for a total of 105 hours in small groups. Participants were randomly assigned to one of three reading intervention groups or to the school's special education control program. The interventions primarily

targeted students' PA skills and focused on individualized instruction. Overall, results of the study revealed that children who received treatment did better than the control group. Specifically, NES and ELs performed equally well on various reading measures. Both groups also displayed similar growth over time, suggesting that ELs can make significant gains comparable to their NES peers at a similar rate.

PA focused interventions for monolingual speakers & ELs. In 2000, the National Reading Panel (NRP) conducted a meta-analysis to examine the effects of PA instruction on literacy outcomes for at-risk students (Ehri et al., 2001). The analysis included 52 peer-reviewed studies that included treatment and control groups. These studies focused solely on phonemic awareness instruction, a subset of PA, whereas the studies previously discussed included instruction in various early literacy skills. Whereas PA refers to the understanding that speech is made up of sounds, phonemic awareness refers to the understanding that words can be analyzed and manipulated down to their individual sounds (Rathvon, 2004). In these studies, phoneme instruction occurred either with or without phonics instruction. The primary outcome measures included composite scores of PA, reading, and spelling (Ehri et al., 2001). Participants included monolingual speakers of various languages (i.e., English, Danish, Dutch, Finnish, German, Spanish, etc.) and ELs ranging from preschool to sixth grade. In most studies, the primary language of instruction was English. The studies included either small group or individualized interventions that ranged from one to 75 hours (Ehri et al., 2001).

Results of the meta-analysis revealed that phoneme instruction yielded large significant gains in students' literacy skills (i.e., $d = .87$ for segmenting), particularly for pre-school children ($d = 1.25$). Phoneme instruction also resulted in significant moderate gains for reading and spelling. For reading, such results were maintained during the follow-up period. Additionally, reading comprehension was found to improve (Ehri et al., 2001). Another important finding was that small groups were found to be more effective than large groups. Overall, the results of this meta-analysis led the NRP to conclude that phoneme instruction results in improved literacy skills (Ehri et al., 2001).

Studies with Spanish speaking ELs. Researchers have often examined the effects of English literacy interventions for Spanish speaking ELs (e.g. Gunn, Biglan, Smolkowski, & Ary, 2000; Leafstedt, Richards, & Gerber, 2004). However, more recently, researchers have explored the effects of interventions

delivered in these students' native language (e.g. Vaughn et al., 2006b) or in both English and Spanish (e.g. Quiroga et al., 2002). The following is a review of studies specific to English interventions, Spanish interventions, and English and Spanish interventions for Spanish speaking ELs.

ELs receiving English-only intervention. Gunn et al. (2000) examined the effects of two supplementary English literacy interventions among 256 Spanish-speaking ELs. Participants were screened to identify those most at-risk for reading difficulties. At-risk students were randomly assigned to a treatment group or a control group. The treatment group consisted of students in first grade through fourth grade. Beginning readers in first and second grade received an intervention focused on PA, phonics, decoding, and fluency. Poor readers in third and fourth grade received a similarly focused intervention, excluding PA and including comprehension. Most students received intervention in small groups of two to three. One session of the intervention was delivered daily, for 20-30 minutes. Reading was assessed in the fall of the first year (Time 1), spring of the first year (Time 2), and the spring of the second year (Time 3). Results revealed that students who received intervention performed similar to their non-EL peers in the control group achieving significant results on word reading at Time 2 and on word reading, vocabulary, and reading comprehension at Time 3. Intervention students at Time 3 also performed better than the control group on a measure of fluency, although this result was not statistically significant. Another important finding was that students' level of English proficiency did not affect the effectiveness of the intervention, suggesting that such interventions are appropriate for ELs with low English proficiency levels.

Gunn, Smolkowski, Biglan, and Black (2002) later extended their previous study (i.e., Gunn et al., 2000) by examining the effects of treatment a year later. Results of their study revealed that students in the intervention groups continued to make gains in letter word identification, word reading, and oral reading fluency. Furthermore, the researchers' previous finding was supported in that literacy gains were apparent for all EL participants regardless of their English language proficiency levels.

Gunn, Smolkowski, Biglan, Black, and Blair (2005) further extended their previous studies (i.e., Gunn et al., 2000 & Gun et al., 2002) by examining a larger group of participants longitudinally with an added intervention component focused on social skills and parent training. Similar to their previous studies, students were initially screened in kindergarten through third grade. At-risk students were then

randomly assigned to one of two intervention groups consisting of 30 minutes of daily literacy instruction in English, parent training, and a social skills component. Beginning readers in first and second grade received an intervention focused on PA, phonics, decoding, and fluency. Poor readers in third and fourth grade received a similarly focused intervention, including comprehension and excluding PA. All students in either treatment group received their supplementary instruction for 6-7 months during the first year of the study and for 9 months during the second year of the study. With respect to the parent component, all parents were provided with a parent-training program consisting of 12-16 sessions in relatively small groups for approximately 2 hours a week. For the social skills component, two programs focused on problem solving were used. Results of the study revealed that students in the intervention groups performed significantly better than the control groups on letter word identification, word reading, oral reading fluency, vocabulary, and comprehension. Over the course of the study, intervention students typically grew faster than their peers in the control group. Additionally, results of a 2-year follow up revealed that students' literacy gains were maintained.

In another study, Leafstedt, Richards, and Gerber (2004) examined the effects of a 10 week intensive individualized PA intervention among 18 kindergarten ELs, most of whom only spoke Spanish. Core reading instruction was in English, however, Spanish was occasionally used to supplement explanations. All intervention students received a total of 5 hours of intensive PA instruction focused on rime, onset, segmenting, and blending. A direct instruction strategy designed by the authors was also used: Core Intervention Model (CIM). With the CIM, teaching occurred in a sequence, in which the demands of students were reduced systematically until students were able to respond correctly. Overall, results revealed that the treatment group outperformed the control group, demonstrating gains in both PA and phonics. Differences in performance were also noted by each ability-group (i.e., low, middle, and high ability-level groups). Specifically, high performing students remained high and low performing students remained lower than the middle and high performing students.

A study conducted by Healy, Vanderwood, and Edelston (2005) also examined the effects of a PA intervention among first grade ELs who were in mainstream English classrooms. Students were screened with a PA and phonics measure to identify those most in need of Tier 2 reading intervention. The lowest

15 ELs were then selected to receive a PA focused intervention twice a week for 30 minutes. Depending on students' progress, 12-25 sessions were provided over the course of the intervention. Weekly progress monitoring occurred and participants exited the intervention if they reached a pre-determined level on both a PA and phonics measure. Following the intervention, 12 of the 15 students exited the intervention. Specifically, most students surpassed the benchmark goal providing additional support for using an RtI model to intervene with at-risk ELs.

Although the studies discussed thus far have strictly examined students' English skills, other studies have investigated the impact of an English intervention on ELs English and Spanish skills. In a study conducted by Vaughn et al. (2006a), 22 at-risk students were randomly assigned to a treatment group and 19 students served as controls. All students received core literacy instruction in English. The intervention provided focused on PA, phonics, fluency, vocabulary, comprehension, spelling, and writing. Students in the treatment group received intervention for 7 months, 50 minutes per session, in small groups of 3-5 by trained bilingual reading teachers. Gersten and Baker's (2001) recommended instructional practices for ELs were also used (i.e., explicit teaching, use of gestures, corrective feedback etc.). Results revealed that the intervention group outperformed the control group on English PA, letter naming, and reading. Gains were also apparent in Spanish, but were fewer and less effective than the gains made in English. Nevertheless, the strongest gains in Spanish were in PA, phonics, and reading comprehension. The strongest effects favoring intervention students were in PA and related reading skills. Effect sizes ranged from 0.76 to 1.24 (moderate-large), with the largest effect being the PA cluster. Such findings have been replicated by Mathes and colleagues (2007), revealing that students have maintained their gains by the end of second grade. Overall, these intervention studies support the cross language transfer of PA suggesting that gains in English influence gains in Spanish.

Although some of the studies discussed (e.g. Healy et al., 2005; Leafsteadt et al., 2004) have used university or school (e.g. Vaughn et al., 2006a) personnel to deliver the intervention under investigation, other studies have examined the effect of intervention using both university and school personnel. Such collaboration has generally resulted in positive outcomes for ELs. One study conducted by Haager and Windmueller (2001) examined the outcomes of an intensive professional development program (i.e.,

Project Plus: Partnership Linking University School Personnel) for 355 first and second grade students. This program was specifically designed to improve ELs literacy skills by providing ongoing professional development for teachers through workshops and consultation services. During these services, teachers received activities for their students focused on PA, phonics, and fluency. Results following the first year of Project Plus revealed that both at-risk and LD students made progress on their literacy skills. Overall, both groups displayed stable growth rates for the targeted skills, excluding fluency. Several students were still found to be in the at-risk range for fluency after the intervention. For this reason, Haager and Windmueller (2001) mentioned that additional research was necessary. However, other researchers share similar results.

For instance, Denton, Anthony, Parker, and Hasbrouck (2004) investigated the effectiveness of two English literacy interventions among 51 at-risk bilingual students in grades 2-5. All participating students were in transitional bilingual programs and were, thus, receiving core literacy instruction in English, Spanish, or in both languages. The interventions occurred over the course of 10 weeks, three times a day, for 40 minutes. One intervention group consisted of phonics instruction and reading practice while the other intervention group focused on repeated readings, vocabulary, and comprehension skills. Students were randomly assigned to one of these two intervention groups or to a control group. Results revealed that students who received phonics instruction and reading practice outperformed the control group on one of the three outcome measures: word identification. In comparing the other intervention group with the control group, significant differences were *not* found on any of the outcome measures: word identification, word reading, or passage comprehension.

Following the discussion on the impact of English literacy interventions for Spanish speaking ELs, there are important findings worth mentioning overall. First, several of the studies reviewed revealed that students' level of English proficiency did not negatively affect the effectiveness of the intervention (Gunn et al., 2000; Gunn et al., 2002; Leafstedt et al., 2004; Vaughn et al., 2006a). This suggests that early literacy interventions are appropriate for ELs regardless of their English proficiency level. Second, in several of the studies discussed, ELs were found to make literacy gains in a relatively short amount of time (e.g. 10 weeks) when provided with intensive intervention (Denton et al., 2004; Healy et al., 2005;

Leafstedt et al., 2004). Therefore, long interventions are not always necessary. Third, students were found to make gains regardless of who delivered the intervention. In the studies conducted by Leafstedt et al. (2004) and Healy et al. (2005) positive results were found when university personnel delivered the intervention. Students were also found to improve in their literacy skills when school personnel were used (Vaughn et al., 2006a) or when both school and university personnel collaborated (Haager & Windmueller, 2001). Lastly, some of the studies discussed yielded mixed results in which the treatment group did not always outperform the control group on all the outcome measures (Denton et al., 2004; Haager & Windmueller; 2001).

ELs receiving Spanish-only intervention. Providing students with literacy instruction in their native language has been at the center of much controversy. While there is research to support bilingual reading instruction for the improvement of both English and Spanish literacy skills (August & Shanahan, 2006), other studies found no additional benefit for students acquiring literacy skills in English (Slavin, Madden, & Calderón, 2010). Furthermore, much of the research in this area tends to be clouded by political controversy. States such as California and Arizona have proposed propositions which have restricted bilingual education in their respective school districts (Slavin & Cheung, 2005). This has served to discourage bilingual education on the whole. However, most of this research examines core literacy instruction among students immersed in bilingual programs for an extended time (e.g. late exit models). In addition, such students may or may not be ELs. Thus, there is little research that has focused on providing ELs with supplemental literacy instruction in their native language. The following discussion reviews some of the studies that have examined the effect of interventions delivered in students' native language.

Escamilla (1994) examined the effects of a supplemental Spanish reading intervention among 180 first grade Spanish-dominant ELs. Students were selected to participate in the intervention if they displayed low Spanish reading achievement. The Spanish intervention provided was designed to assist first grade students at-risk for reading problems. More specifically, it provided intensive one-on-one instructional support for 30 minutes a day over the course of 12-16 weeks. Lessons targeted students' skills in word identification, fluency, and writing. During the time of the study, all participants were initially receiving core literacy instruction in Spanish. Results revealed that students significantly improved in their

literacy skills upon completion of the intervention. These gains were significant compared to an at-risk control group. Significant differences on all outcome measures were noted between the treatment group and the control group. Specifically, the treatment group outperformed the control group on all measures from fall to spring. Similarly, students in the treatment group also surpassed their non-at-risk peers on all outcome measures.

Another study by De La Colina, Parker, Hasbrouck, and Lara-Alecio (2001) examined the effect of an early literacy intervention among native Spanish speaking ELs. Three groups of 53 at-risk students in grades 1-2 were provided with a 12-week, 10-week, or 8-week intervention depending on group assignment. The intervention was delivered three times a week for 45 minutes a day. Participants received core literacy instruction in both English and Spanish as students were in transitional bilingual programs. The intervention provided combined repeated readings, teacher modeling, and student self-monitoring to improve students' fluency skills. Using a multiple baseline single case design, each of the three groups was analyzed separately. Overall, results revealed that the majority of students receiving intervention made improvements in their comprehension skills and even greater gains in their reading fluency skills.

Gerber et al. (2004) examined whether a Spanish PA intervention would increase ELs English literacy skills through the use of an intervention *strategy*. This intervention strategy (i.e., the CIM) was also used in the Leafsteadt et al. (2004) study. As previously mentioned, the CIM was designed specifically as a Tier 2 instructional *method* that would control interventionist's actions rather than the materials used. Therefore, the instructional application of CIM was the focus of this study. CIM consisted of direct and explicit instruction for small groups of students with corrective procedures at its core. In addressing students' errors, a correction routine referred to as the 'correction staircase' was used. Teaching occurred in a sequence, in which the demands of students were reduced systematically until students could respond correctly. The materials used were sampled from existing curricula used in students' respective classrooms. The primary focus was on students' PA skills (i.e., rime detection, onset detection, and phoneme segmentation and blending). Forty-three kindergarten students who demonstrated low reading achievement in the larger *La Patera* study were selected to participate in this study. These students were

provided with 300 minutes of intervention which included a Spanish PA intervention in kindergarten and an English PA intervention in first grade. Results revealed that the treatment group performed similar to their higher-performing peers by the end of first grade. Specifically, the rate at which skills were gained was similar to their higher-performing peers and the achievement gap was closed on all but one of the outcome measures by the end of first grade.

In another study, Vaughn et al. (2006b) examined the impact of a Spanish intervention on students' English and Spanish skills. Similar to their study conducted in English (Vaughn et al., 2006a), Vaughn and colleagues (2006b) examined the impact of the Spanish version of the English intervention previously used. Sixty-four at-risk first grade ELs receiving core instruction in Spanish participated in the study. Students were randomly assigned to the treatment group or the control group. As in the English study (Vaughn et al., 2006a), students in the treatment group received the intervention daily for 7 months, 50 minutes per session, in small groups of 3-5. Following the intervention, the treatment group was found to perform better on several reading measures in Spanish. The treatment group had increased growth in written Spanish comprehension and also higher comprehension overall. Both the treatment group and the control group made gains in English, but significant differences were not found, suggesting that the development of PA skills in a student's native language does not hinder English literacy development. Effect-sizes ranged from 0.35-0.85 (small-large). The highest effect size was for phonics followed by PA. Mathes et al. (2007) also replicated these findings, revealing that students were able to maintain such gains at the end of second grade.

Although the studies mentioned thus far have demonstrated that the majority of ELs can make significant improvements in their literacy skills, other research has found contradictory results. For instance, Linan-Thompson, Bryant, Dickson, and Kouzekanani (2005) studied the effects of a supplementary Spanish intervention among Spanish dominant at-risk kindergarteners. All participants were receiving core literacy instruction in Spanish. The supplementary Spanish intervention consisted of PA, phonics, reading, writing, and spelling. Classroom teachers delivered the intervention over the course of four weeks (20 minutes a session, 3 sessions a week). The control group participated in independent literacy activities conducted in their respective classrooms. Participants in the control consisted of students

in two different schools: (1) Typical (not-at-risk) students from the same school as the treatment participants, and (2) At-risk students from another school. Results of the study revealed that students in the intervention group made substantial gains in their Spanish literacy skills. However, these gains were not statistically significant compared to the not-at-risk students. These literacy gains were only found for 6 of the 10 outcome measures. Significant differences were not found for 9 of the outcome measures between the treatment group and students who were at-risk (i.e., control group 2). This suggests that students in the treatment group and students in the control group performed similarly.

ELs receiving both English and Spanish intervention. Quiroga et al. (2002) examined the impact of a PA focused intervention in both English and Spanish. A 6-week intervention was delivered to 8 at-risk first grade ELs. The intervention targeted PA, phonics, fluency, and comprehension. PA was the only skill taught in both English and Spanish. After receiving individualized instruction, students were found to improve in their word reading.

As with the English intervention studies reviewed, the Spanish intervention studies revealed a similar finding. Most of the studies (De La Colina et al., 2001; Escamilla, 1994; Quiroga et al., 2002) demonstrated the effectiveness of short-term interventions (e.g., 6-16 weeks). Interestingly, the study by De La Colina et al. (2001) revealed that the length of the intervention did *not* have an effect on students' performance, contrary to the researchers' expectations. Several students in the shortest intervention group (i.e., 8-weeks) made just as much progress as those in the 12-week intervention. These findings suggest that short-term interventions may be as effective as longer interventions.

Limitations in the EL Intervention Research

While the majority of studies discussed have resulted in improved outcomes for ELs, there are limitations worth discussing. As previously mentioned, most studies reviewed demonstrated positive effects for ELs. However, some of the research findings were mixed, occasionally resulting in stronger outcomes for the control groups (e.g. Denton et al., 2004) or lacking significant differences between the treatment and control groups (Linan-Thompson et al., 2005). Recall that in the Denton et al. (2004) study, one of the intervention groups did not outperform the control group on any of the outcome measures. Significant differences were not found between this treatment group and the control group. The other

intervention group outperformed the control group solely on one of the three outcome measures. Similarly, in the study conducted by Linan-Thompson et al. (2005), students in the intervention group only made considerable gains in their Spanish literacy skills in comparison to the non-at-risk students. Even though gains were made, these gains were not significant and were only found for six of the 10 outcome measures. The control group outperformed these students on the other four measures. Additionally, in comparison to the other control group (i.e., students who were at-risk), significant differences were not found for nine of the outcome measures. The at-risk control group outperformed the treatment group on the other outcome measure. Therefore, in an effort to determine whether short-term reading interventions are truly effective additional high-quality research is needed.

A second limitation is that most of the intervention research with ELs has focused on the effect of intervention on students' English skills. Few studies (e.g. Vaughn et al., 2006a; Vaughn et al., 2006b) have examined the impact of intervention on students' skills in both English and Spanish. It is important to determine the effect of intervention in both languages because skills gained in one language can facilitate the development of skills in another language (August & Shanahan, 2006). More studies were also conducted in English in comparison to studies provided in a student's native language. Furthermore, researchers commonly matched the language of the intervention to the participants' core instruction (e.g. Escamilla, 1994; Healy et al., 2005; Linan-Thompson et al., 2005; Vaughn et al., 2006a; Vaughn et al. 2006b). Although utilizing the same language in intervention and core instruction has resulted in positive outcomes, further research needs to examine the effects of utilizing students' native language in intervention when the core instruction is in English. This is important to explore given that native language skills can foster the development of skills in a second language (August & Shanahan, 2006). Assuming the improvement of students' second language reading skills, such a study would provide preliminary support for providing Spanish-speaking ELs with supplemental instruction in their native language rather than providing it solely in English. Given that most ELs receive general instruction in an English-only environment, it is important to help ELs succeed in these environments.

Another limitation worth mentioning is the lack of psychometric evidence for the measures used in the EL intervention research. Some of the studies reviewed did not provide psychometric evidence for

the measures used (e.g. Bravo-Valdivieso, 1995; Leafsteadt et al., 2004). Caution needs to be taken when assessing ELs as various tests often do not have appropriate psychometric evidence for the ELs in question. According to the *Standards for Educational and Psychological Testing* (AERA, APA, NCME, 1999) tests need to have adequate validity for the specific language group targeted. If such information is not provided, one cannot be certain that the results are valid.

Lastly, only one reviewed study (e.g. Healy et al., 2005) included specific information regarding students' English proficiency levels, grouping them accordingly. Other studies have depicted ELs as a homogeneous group without consideration for levels of English language proficiency. However, it is widely known that ELs possess a wide range of English language skills (Hart & Risley, 1995). According to Baker and Baker (2009), the acquisition of a second language consists of five key linguistic elements: Phonology, syntax, morphology, semantics, and pragmatics. The importance of each element varies depending on the developmental stage of a second language learner. A mature speaker, for instance, may have already acquired phonology, morphology, and semantics to understand the pragmatics of language whereas a beginner may only have acquired phonology. This suggests that there are fundamental differences between more mature speakers and less mature speakers with respect to the acquisition of a second language. For this reason, future research should examine ELs by levels of English language proficiency.

Rationale for the Proposed Study

Given the limitations previously discussed, additional research with ELs is necessary. Due to the expected increase of ELs (NICHD, 2003), in addition to their high-risk status (Artiles et al., 2005; NCES, 2009), reading is a crucial area that needs to be further explored with this population. More importantly, research among young Spanish-speaking school aged children is vital as the majority of ELs speak Spanish (Zehler et al., 2003). Furthermore, because the first stages of reading development occur when students are in the early primary grades (i.e., K-2) young children need to be targeted.

Therefore, there is a need for high quality intervention research to examine the impact of PA focused instruction on literacy achievement in both English and Spanish. The majority of the research studies discussed,

As previously discussed, limited research has examined the effects of matching the language of a PA intervention with a student's native language. Furthermore, the question of whether ELs benefit from a PA intervention delivered in their native language, while receiving core instruction in English, remains to be answered. A study in this area is necessary to better understand the role of a student's native language in fostering his/her reading skills in a second language. If students who receive a supplemental Spanish intervention are found to make literacy gains in English, this would provide preliminary support for providing Spanish-speaking ELs with supplemental instruction in their native language rather than providing it solely in English. Additionally, assuming that a short-term intervention would result in positive outcomes, temporary supplemental instruction would be cost effective. This is important as it could offset the cost of remedial education, particularly for districts who have limited financial resources.

Furthermore, such a study has implications for families of ELs who solely speak Spanish. A vast majority of ELs live in homes with adults who are also ELs (Capps et al., 2005). Thus, if a PA focused intervention in Spanish results in positive outcomes for ELs, future research could explore the possibility of developing a parent component. Parents and family members could potentially provide reading support in the home either prior to their child's entry into school or during the school year. PA skills, in particular, could be taught and/or further developed by engaging children in a number of oral language activities in Spanish (e.g. songs that rhyme, tongue twisters; Yopp & Stapleton, 2008). Such skills do not require advanced understanding of Spanish, which is beneficial to all children regardless of language proficiency level. Given the transfer of these skills between languages, the development of PA in a student's native language would strengthen their literacy skills in English.

Lastly, and perhaps more importantly, there is a need for high quality intervention reading research. While most of the studies discussed have used the highly regarded randomized experiment, there are other designs available that are also appropriate for reading intervention research. One such design is Regression Discontinuity (RD). RD is most appropriate when random assignment is not possible, which may often be the case in reading intervention research. RD is a two group pre-test post-test model that has some of the scientific qualities of a randomized experiment, and is aligned with accepted clinical practice. The benefit of such a design is that it allows all subjects who need treatment to receive treatment. It also

has some of the scientific qualities of a randomized experiment in that the researcher controls the assignment of the intervention. In doing so, the researcher can make a more valid assessment of the effectiveness of the intervention. Thus, it is more of a realistic alternative when random assignment is not possible.

Purpose of Study

The purpose of this study was to examine the effect of a supplemental-targeted PA intervention delivered in Spanish to small groups of at-risk kindergarten students. The following research questions were examined:

- **Research Question 1a:** To what extent is there a statistically significant difference between the Spanish intervention group and the comparison group on students' *English* PA skills?
- **Research Question 1b:** To what extent is there a statistically significant difference between the Spanish intervention group and the comparison group on students' *English* phonics skills?
- **Research Question 2a:** To what extent is there a statistically significant difference between the Spanish intervention group and the comparison group on students' *Spanish* PA skills?
- **Research Question 2b:** To what extent is there a statistically significant difference between the Spanish intervention group and the comparison group on students' *Spanish* phonics skills?
- **Research Question 3:** To what extent is there a difference in the growth on English vs. Spanish measures of PA and phonics?
- **Research Question 4:** To what extent can the intervention be delivered with integrity?

Hypothesis for Research Question 1a and 1b. Based on previously discussed research, it is hypothesized that the intervention will positively influence students' PA and phonics skills in English. Specifically, the Spanish treatment group is expected to perform higher than what would be anticipated had they not received the intervention. This hypothesis is based on previous research that suggests a cross-language transfer effect of PA skills, which is a pre-requisite for phonics (Quiroga et al., 2002). As previously mentioned, PA is a cognitive process independent of language (Lindsey, Manis, & Bailey,

2003). Therefore, developing PA skills in a student’s native language (e.g. Spanish) is likely to help strengthen their PA and phonics skills in a second language (e.g. English).

Hypothesis for Research Question 2a and 2b. Based on previously discussed research, it is hypothesized that the intervention will positively influence students’ PA and phonics skills in Spanish. Specifically, the Spanish treatment group is expected to perform higher than what would be anticipated had the students not received the intervention. This is because these students will be receiving PA instruction in Spanish whereas the other students will not.

Hypothesis for Research Question 3. Given that students received additional support in Spanish, it is hypothesized that there will be a difference in the growth on English vs. Spanish measures of PA and phonics. Given that these students will be native Spanish speakers with low levels of English proficiency, it is hypothesized that they will learn PA skills at a faster rate in their native language. Thus, students’ literacy growth as measured by Spanish PA and phonics is likely to be greater than their literacy growth as measured by English PA and phonics.

Hypothesis for Research Question 4. Given that the intervention was designed to be easily implemented, it is hypothesized that the intervention will be delivered with a high degree of integrity.

Method

Participants

Participants in this study included 60 Spanish-dominant Hispanic/Latino kindergarten ELs with low levels of English proficiency. Students were selected across nine classrooms from three public elementary schools in one low-performing school district serving a large percentage of low-income students. During the time of the study, the district was considered a “year 3 program improvement district” with all three participating schools qualifying for Title 1 funds. The schools serve a large percentage of Hispanic/Latino students (92%, 83%, and 88%). Approximately 83% of participants qualified for free or reduced lunch. The sample consisted of 20 students in the treatment group and 40 in the comparison group. The sample size for the treatment group and comparison group was determined by using recommendations from Cappelleri, Darlington, and Trochim (1994) for regression discontinuity designs. The treatment group consisted of 11 males and 9 females, and the comparison group consisted of 21 males and 19 females. The

average age of the participants was 5.6 years for the treatment group and 5.7 years for the comparison group. See Table 1 for demographic variables.

All participants were enrolled in half-day kindergarten programs with an average class size of 19 students. General reading instruction was provided for a total of 2 hours a day in the general classroom. All students received the same district-mandated core literacy curriculum (i.e., Houghton Mifflin), which was delivered in English. Houghton Mifflin's kindergarten curriculum contained 10 themes (e.g., Look at Us!) that targeted the five components of reading: phonological awareness, phonics, fluency, comprehension, and vocabulary. The participants also received 30 minutes per day of English language development instruction in the classroom using a program called *Moving into English* by Houghton Mifflin. The primary purpose of *Moving into English* is to develop students' language acquisition by targeting phonemic awareness, phonics, language exploration, comprehension, and fluency. The content of each lesson is separated into three steps entitled, Talk About it, Read About it, and Write About it (Houghton Mifflin Harcourt, 2010).

Procedure

To obtain an adequate sample, all students who met the study's inclusion criteria (i.e. kindergarten Spanish-dominant ELs with low levels of English language proficiency) were screened using English and Spanish measures of PA. The purpose of the PA measures was to determine eligibility for the study as well as placement in either the treatment or comparison group. To qualify for the treatment group, students needed to have scores below a pre-determined cutoff for both English and Spanish PA (i.e., 9 and 14, respectively). To qualify for the comparison group, students needed to have scores above the pre-determined cutoff for both English and Spanish PA. These scores were selected from DIBELS Next and IDEL's winter benchmark guidelines regarding risk status for reading failure (Good, Baker, Knutson, & Watson, 2009; Kaminski, Cummings, Powell-Smith, & Good, 2008). Seven students with discrepant PA scores (i.e., high English PA and low Spanish PA; or low English PA and high Spanish PA) did not qualify for either group and their data were not included in the study.

Parental consent and student assent were obtained for students who qualified for the treatment group. The treatment group received a 30-minute Spanish PA intervention three times a week for 9 weeks.

Over the course of the study, the treatment group received a total of 13 hours of intervention. The decision to deliver 13 hours of intervention was based on findings of the NRP's meta-analysis on PA instruction which revealed largest effect sizes for interventions that ranged from 10-18 hours ($d = 0.86$). The intervention was delivered by the author and one other trained bilingual graduate student in small groups of two to five students. The study included a total of six intervention groups. The intervention curriculum consisted of 12 sessions. Following the completion of session 12, the intervention was cycled through again beginning with session 1. Over the course of the study, the intervention curriculum was completed approximately 2.2 times.

For students in the treatment group, progress in PA and phonics in both English and Spanish was monitored weekly during the length of the intervention (i.e., 9 weeks). Intervention delivery and test administration occurred in a quiet environment. Two intervention groups received the intervention in a quiet corner in their general classroom; four intervention groups received intervention in a nearby empty classroom outside of their general classroom. The intervention time did not conflict with the students' general reading instruction time.

Training for individuals who assisted in the collection of data and/or delivery of the intervention consisted of modeling standardized procedures and guided practice. All data, with the exception of English language proficiency, were collected by the author and three graduate students who had been trained in standardized test administration. To measure English language proficiency, CELDT scores were obtained from the schools.

Measures

California English Language Development Test (CELDT). The CELDT (CDE, 2007) was used to determine students' levels of English language proficiency. The CELDT is a state test used in California that is required for all students in grades K-12 whose primary language is not English. It is administered annually for the purposes of educational planning and assesses students in four areas: Reading, Writing, Speaking, and Listening. As indicated in the technical manual, scores derived from the CELDT are said to reflect English language proficiency and not academic achievement (CDE, 2007). The CELDT yields scores that range from Beginning (Level 1) to Advanced (Level 5).

Reliability (i.e. internal consistency) of the CELDT, across all grade levels (K-12) and test domains, ranges from .80-.93 (CDE, 2007). Validity support for the CELDT has been established mainly through qualitative methods (i.e. expert judgment). The CDE (2007) stated that the CELDT has been designed to mirror the English Language Development Standards for the state of California. With respect to the CELDT's content validity, it has been examined through the distinction of language ability as opposed to academic achievement. Convergent validity has been supported by way of intercorrelations among CELDT scales, ranging from .41-.67 (CDE, 2007).

Dynamic Indicators of Basic Early Literacy Skills (DIBELS) Next. DIBELS Next have been well established as effective measures for screening and progress monitoring at-risk students (Good & Kaminski, 1996; Kaminski, Cummings, Powell-Smith, & Good, 2008). DIBELS Next measures serve as technically adequate indicators of basic early literacy skills: PA, phonics, fluency, vocabulary, and comprehension, all of which are vital components for reading achievement; NRP, 2000). DIBELS' PA and phonics measures in particular (i.e., Phoneme Segmentation Fluency and Non-sense word Fluency) have been shown to be technically adequate for NES (Kaminiski & Good, 1996) and ELs (Baker & Good, 1995; Healy et al., 2005). Reliability coefficients for the DIBELS Next measures range from .72 to .94 (Salvia & Ysseldyke, 2007). Content validity is supported by a number of studies that highlight the importance of fluency for each of the measure's skills (Good & Jefferson, 1998; Kirby, Parrila, & Pfeiffer, 2003; Salvia & Ysseldyke, 2007; Schatschneider, Fletcher, Francis, Carlson, & Foorman, 2004). Criterion-related validity coefficients, with norm referenced reading tests range from .54 to .65 for PSF and .36 to .66 for NWF (Salvia & Ysseldyke, 2007).

DIBELS Next phoneme segmentation fluency (PSF). DIBELS' Next kindergarten PSF measure (Good & Kaminski, 2002) was used as a pre-test (screener) and post-test measure to assess subjects' PA skills in English. Additionally, it was used to progress monitor students' PA skills. DIBELS Next PSF is one of several standardized early literacy measures designed to evaluate a student's reading ability in the area of PA. It is individually administered and takes one minute to complete. The assessor examines the number of phonemes a student is able to correctly segment when orally presented with different words of three to four phonemes. The final score is the correct number of phonemes produced by the student.

DIBELS Next nonsense word fluency (NWF). DIBELS' Next kindergarten NWF measure (Good & Kaminski, 2002) was used as a post-test measure to assess subjects' phonics skills in English. Additionally, it was used to progress monitor students' phonics skills. DIBELS Next NWF is designed to evaluate a student's reading ability in the area of phonics. It is individually administered and takes 1 minute to complete. The assessor examines the number of sounds a student is able to correctly produce when visually presented with a list of randomly ordered VC and CVC nonsense words (e.g. lub, zuz, ul). A student may either read the words or may provide the assessor with the individual letter sounds of each word. The final score is the correct number of letter sounds produced by the student.

Indicadores Dinámicos del Éxito en la Lectura (IDEL). In addition to DIBELS' English measures, the researchers at the University of Oregon have also developed the Spanish version of DIBELS: Indicadores Dinámicos del Éxito en la Lectura. Similar to DIBELS, IDEL is research based and is designed to measure students' early literacy skills in Spanish. The research conducted with IDEL has shown that its measures serve as reliable and valid indicators of students' reading proficiency in Spanish (Good, Baker, Knutson, & Watson, 2009). In addition to the research that has been conducted in U.S. schools, data for IDEL has also been conducted in Mexico to further analyze the reliability and validity of its measures among a population of native Spanish speakers. As indicated by its authors, IDEL is appropriate to use with students who are learning to read entirely in Spanish and with those who are learning to read in two languages (e.g. students in bilingual, transitional, or two-way immersion programs; Good et al., 2009).

IDEL's fluidez en la segmentación de fonemas (FSF). IDEL's kindergarten FSF measure (Baker, Knutson, Good, & Plasencia-Peinado, 2006) was used as a pre-test (screener) and post-test measure to assess subjects' PA skills in Spanish. Additionally, it was used to progress monitor students' PA skills. IDEL's FSF is one of several standardized early literacy measures designed to evaluate a student's reading ability in the area of PA. It is individually administered and takes one minute to complete. The assessor examines the number of phonemes a student is able to correctly segment when orally presented with different words of three to four phonemes (one to three syllable words). The final score is the correct number of phonemes produced by the student.

IDEL's fluidez en las palabras sin sentido (FPS). IDEL's kindergarten FPS probe (Plasencia-Peinado, Baker, Good, & Peinado, 2006) was used as a post-test measure to assess subjects' phonics skills in Spanish. It was also used to progress monitor students' phonics skills. IDEL's FPS is designed to evaluate a student's reading ability in the area of phonics. It is individually administered and takes 1 minute to complete. The assessor examines the number of sounds a student is able to correctly produce when visually presented with a list of randomly ordered CV and CVCV nonsense words (e.g. ro, lali, sepi). A student may either read the words or may provide the assessor with the individual letter sounds of each word. The final score is the correct number of letter sounds produced by the student.

Inter-rater Reliability. Inter-rater reliability data were collected during the screening phase of the study (i.e., pre-intervention and post-intervention) and over the course of the intervention while monitoring students' progress. Inter-rater reliability data were collected for 12% of the DIBELS and IDEL administrations, and resulted in 97% agreement. Inter-rater reliability was calculated by dividing the number of agreements by the total number of agreements and disagreements.

Intervention

Spanish-only curriculum. A translated version of a manualized intervention program, modified from an existing curriculum (i.e., Sounds and Letters for Readers and Spellers; Greene, 1997), was used for this study. The intervention consisted of 12 sessions of approximately 30 minutes of PA instruction. The session format included 6 sections, the last 5 of which were specific to PA activities: Vocabulary, Phoneme Production/Replication, Phoneme Segmentation and Counting, Phoneme Blending, Phoneme Isolation, and Rhyming. Research suggests that the combination of blending and segmenting instruction produces greater literacy gains than teaching them separately (O'Connor et al., 1995). Furthermore, this technique tends to assist students in the acquisition of other related phonemic tasks, such as rhyming and phoneme deletion (O'Connor et al., 1995).

For the vocabulary section, the words chosen reflected the specific sounds that were being introduced for that lesson. Several of the words were also selected from the *Silabario Hispanoamericano (Nueva edición; Dufflocq Galdames, 2006)* which is used in several Spanish speaking countries to teach literacy. With respect to the Segmentation section of the intervention, students were taught to break words

down to the phoneme level as opposed to the syllable level. For the Blending portion of the intervention, students were asked to blend words that were orally presented by their individual phonemes. Although Spanish words more easily divide into syllables versus individual phones (Freeman & Freeman, 2006), the ultimate goal for students learning any alphabetic language is to learn to break down words to their individual phonemes (Culatta et al., 2006). Research further suggests that breaking words down to the phoneme level is associated with higher levels of PA (Jiménez & Ortiz, 2000). Similarly, Carillo (1994) conducted a study among kindergarten and first grade students in Murcia, Spain and found that the PA tasks that separated good readers from average-poor readers were the tasks that involved segmentation of individual phonemes.

Furthermore, only words with one or two syllables were included to make the activities easier for the students. During each session, different letter sounds were introduced. Prior to the beginning of a new session, a review of each previous session's phonemes occurred. Also, three of the twelve sessions consisted of a cumulative review of all phonemes from previous sessions. During these specific 'review sessions' new sounds were not introduced. For each section of the intervention, students were encouraged to respond in unison and individually (when prompted). Several instructional strategies that have been found to benefit ELs were used during the delivery of the intervention: Explicit instruction, interactive teaching, opportunities to respond, and corrective feedback (Gersten & Baker, 2001). Additionally, positive reinforcement (e.g. oral praise, high five) was used as a behavior management strategy.

Treatment Integrity. Treatment integrity data were collected by the author and a bilingual graduate student. Fifty percent of the intervention sessions, for each interventionist, were observed for treatment integrity. A treatment integrity checklist developed using the "Phonological Awareness Training for Reading" protocol was used (Lane & Beebe-Frankenberger, 2004). Feedback regarding any overlooked intervention component was discussed with the interventionist after each observed session. Modeling and guided practice occurred after each session if necessary. Treatment integrity data obtained are discussed in the results section.

Design

A quasi-experimental pre-post design (i.e., regression discontinuity) was used to assess intervention effectiveness (i.e., Research Questions 1 and 2). In a classic RD design, a cutoff score on an assignment variable (i.e., pre-treatment measure; Shadish, Cook, & Campbell, 2002) is used to assign subjects to either the treatment group or comparison group. Subjects are assigned to either group solely on the basis of a cutoff score. The advantage of such a design is that all students considered 'at-risk,' based on their performance on a pre-test measure, can be assigned to the treatment group whereas the students considered 'not-at-risk,' based on their performance on the same pre-test measure, serve as the comparison group. Thus, students scoring on one side of the cutoff score can be assigned to the treatment group (resources permitting) while students scoring on the other side are automatically assigned to the comparison group. In doing so, the students who most need treatment can receive it.

Using regression analysis, at-risk students who receive treatment are compared to the comparison group who do not receive treatment. This is done to determine if a discontinuity, or treatment effect, exists between the regression lines at the cutoff point. A separate regression equation is calculated for the treatment group and for the comparison group. The main assumption of the RD design is that all students, both treatment and comparison, would have the same relationship between their pre-test and post-test scores in the absence of treatment (Trochim, 1984). The treatment effect is the degree to which the post-test values for the treatment group differ from the comparison group at the cut-off. The cut-off is specifically used to assess the treatment effect because that is where the two groups are most alike in their pre-test ability (Trochim, 1984).

Upon visual inspection of a graph, one would see a vertical line (or discontinuity) if a main effect resulted between the treatment group's regression line and the comparison group's regression line. The main effect is represented by the coefficient of the variable denoting group membership. This coefficient estimates the discontinuity at the cut-off. The significance of this coefficient is determined by a standard t-test using the standard error of the coefficient. Interaction effects can also result. This occurs when there is a difference between the slope of the regression line for the treatment group and the comparison group at the cut-off.

The use of an RD design is based on three primary assumptions: (1) use of a cutoff criterion to assign students to a treatment or comparison group, (2) correct estimation of the model, and (3) lack of influential factors that could affect the pre-post relationship (Trochim, 1984). The first assumption refers to the adherence of the cut-off criterion. When researchers do not strictly adhere to the cut-off criterion selected misassignment can occur. This is problematic as it can yield biased estimates. This would result in a “fuzzy” regression-discontinuity as opposed to a “sharp” regression-discontinuity (Shaddish et al., 2002). The second assumption refers to the correct specification of the model. The correct analysis to estimate treatment effectiveness (e.g. linear regression) should be used to precisely describes the actual pre-post relationship (e.g. linear). Failure to do so would result in a misspecification of the model. Because a true model cannot always be known, researchers usually choose a model a priori often based on previous experience with similar data (Trochim, 1984). For the present study, linearity was examined statistically with the inclusion of quadratic terms. The third assumption refers to unintentional factors that could potentially influence the pre-post relationship in the absence of intervention. For instance, if a main effect is revealed one wants to be certain that the effect was due to the intervention and nothing else. For this reason, factors such as age, ethnic background, proficiency level, school location, absence of additional support, and location of intervention delivery were considered and accounted for in the design. Details related to one such factor is discussed in the analysis section below.

Analysis

Data used for all analyses were collected during the winter and spring of 2012. All analyses were performed using IBM SPSS software (version 20) and Microsoft Excel 2010. Although there were 20 treatment participants, 1 participant was excluded from the analyses because it was discovered that he had been receiving additional support throughout the year (i.e., 1 hour of additional literacy support in the home by a private tutor 5 days a week). Therefore, this student was removed from the analyses in an effort to eliminate any confounding variables. The 19 other students who received intervention had not been receiving any additional literacy support.

Given that a classic RD design was used to address Research Questions 1 and 2, three variables were considered: (1) an assignment variable (z), (2) a treatment variable (x), and (3) an outcome variable

(y). For this study, the assignment variable consisted of pre-test measures of students' PA skills (i.e., DIBELS PSF and IDEL's FSF). DIBELS' and IDEL's 'at-risk' winter cut-off scores were used to assign students into groups. The cut-off score for DIBELS PSF for at-risk students in the winter was 9 correctly identified phonemes. The cut-off score for IDEL's FSF for at-risk students in the winter was 14 correctly identified phonemes. As previously mentioned, students who scored at or below 9 in English and at or below 14 in Spanish were considered for treatment to ensure that students were low on both English and Spanish PA. Students with established English and Spanish PA were assigned to the comparison group. DIBELS cutoff scores are criterion-referenced scores that have been empirically validated (Kaminski et al., 2008). Scores for each category (e.g. low-risk) were developed to ensure adequate sensitivity (i.e., correct identification of students at-risk) and specificity (i.e., correct identification of students not at-risk).

The treatment variable (x) was the intervention and the outcome variable (y) was students' PA (PSF/FSF) and phonics skills (NWF/FPS) considered separately in English and Spanish. In an RD design, it is not necessary for the pre-test and post-test measures to be the same (Trochim, 1984). Various relevant post-test measures can be analyzed for the same pre-test (Trochim, 1984). Separate analyses were conducted to individually examine students' PA and phonics skills in each language. Complete data were available for all 59 participants to address Research Questions 1 and 2.

Research Question 1a and 1b. Research question 1a and 1b address the effects of the treatment group on students' *English* PA and phonics skills. Specifically, this question focuses on whether a difference will result between the treatment group and the comparison group on students' English PA and phonics skills. Ordinary least squares regression was used. PA and phonics were analyzed separately.

The model used was as follows: $y_i = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + \beta_3 x_i^* + \beta_4 z_i + \beta_5 x_i^* z_i + \beta_6 x_i^{*2} + \beta_7 x_i^{*2} z_i + e_i$

Where:

y_i = outcome measure for individual i (i.e., scores on DIBELS PSF or scores on DIBELS NWF)

β_0 = y-intercept for the comparison group regression line at cutoff

β_1 = coefficient associated with the covariate (school)

x_1 = covariate (school)

β_2 = coefficient associated with the covariate (teacher)

x_2 = covariate (teacher)

β_3 = slope parameter

x_i^* = pre-test score for individual i minus the value of the cut-off, x_0 (i.e., $x_i^* = x_i - x_0$)

β_4 = treatment effect estimate (i.e., main effect)

z_i = assignment variable (1 if treatment participate; 0 if comparison participant)

β_5 = linear interaction effect (difference in slopes between the lines of the two groups)

β_6 = quadratic pretest coefficient

β_7 = quadratic interaction

e_i = random error for individual i

The decision to include school and teacher variables as covariates was due to the fact that students were obtained from different schools across different classrooms. To control for their influence on students' English reading skills, they were included in the regression model. The inclusion of multiple covariates is not problematic for the regression discontinuity design (Judd & Kenny, 1981).

Research Question 2a and 2b. Research question 2a and 2b address the effects of the treatment groups on students' *Spanish* PA and phonics skills. Specifically, this question focuses on whether a difference will result between the treatment group and the comparison group on students' Spanish PA and phonics skills. Ordinary least squares regression was used. PA and phonics were analyzed separately.

The model used was as follows: $y_i = \beta_0 + \beta_1x_1 + \beta_2x_2 + \beta_3x_i^* + \beta_4z_i + \beta_5x_i^* z_i + \beta_6x_i^{*2} + \beta_7x_i^{*2} z_i + e_i$

Where:

y_i = outcome measure for individual i (i.e., scores on IDEL's FSF or scores on IDEL's FPS)

β_0 = y-intercept for the comparison group regression line at cutoff

β_1 = coefficient associated with the covariate (school)

x_1 = covariate (school)

β_2 = coefficient associated with the covariate (teacher)

x_2 = covariate (teacher)

β_3 = slope parameter

x_i^* = pre-test score for individual i minus the value of the cut-off, x_0 (i.e., $x_i^* = x_i - x_0$)

β_4 = treatment effect estimate (i.e., main effect)

z_i = assignment variable (1 if treatment participant; 0 if control participant)

β_5 = linear interaction effect (difference in slopes between the lines of the two groups)

β_6 = quadratic pretest coefficient

β_7 = quadratic interaction

e_i = random error for individual i

As previously mentioned, the decision to include school and teacher variables as covariates was due to the fact that students were obtained from different schools across different classrooms. To control for their influence on students' Spanish reading skills, they were included in the regression model.

Research Question 3. Research question 3 addresses the extent to which there is a difference in the growth on English vs. Spanish measures of PA and phonics for the treatment participants. Growth rates were calculated for each student for PA and phonics in both English and Spanish. Eleven data points for each student were considered when the slopes were calculated except for 3 students, 2 of whom were missing 1 data point and 1 of whom was missing 2 data points. For the students with missing data, growth rates were calculated with the number of data points available. The 11 data points consisted of the winter screening score (pre-test), the 9 weekly progress monitoring scores obtained throughout the intervention period, and the spring screening score (post-test). Growth rates for each student were obtained using the slope values generated by MS Excel, which used the least squares criteria when fitting a line of best fit to data. A dependent samples t-test was conducted to determine if there was a significant difference in growth between English and Spanish measures of PA and phonics.

Research Question 4. Research question 4 addresses the extent to which the intervention can be delivered with integrity. A treatment integrity checklist consisting of the intervention components was used. Treatment integrity was calculated by dividing the number of intervention components observed by the total number of intervention components.

Results

Results were examined using on Trochim's (2000) guidelines for RD designs. First, visual inspection of the bivariate distribution between students' pre-test and post-test scores occurred. This was

done in order to determine whether there was any visible discontinuity in the relationship at the cut-off. If it was visually clear that a discontinuity was present, the statistical results indicating a program effect served as additional support for a treatment effect (Trochim, 2000). Secondly, the pre-post relationship was statistically examined to determine if it was linear. This was done to avoid a misspecification of the model. Although it was expected that a linear relationship existed, based on similar research in this area (Trochim, 1984), a statistical test provided more certainty of the true pre-post relationship. To do this, the quadratic terms were examined for significance. If both terms were found to be non-significant, the relationship was said to be linear and they were removed from the model. The model was then redefined without these two terms (Trochim, 2000). The next step consisted of the examination of the linear interaction between the pre-test scores and the treatment. If the linear interaction was found to be non-significant, the interaction term was removed from the model and it was concluded that the effect of treatment did not vary by pre-test scores. After refining the model without the interaction term, the final step consisted of examining the main effect to determine whether there was a significant discontinuity at the cut-off between the treatment group and the comparison group. If the coefficient denoting group membership was found to be significant, it was kept in the model along with the school, teacher, and pre-test variables which served as covariates.

Research Question 1a. Visual inspection of the bivariate distribution between students' English PA pre-test scores and students' English PA post-test scores revealed a clear discontinuity at the cut-off, suggesting a treatment effect (see Figure1). To examine the statistical significance of this discontinuity, regression analysis was used. First, the proposed model was examined for linearity. As expected, results of the proposed model revealed non-significant quadratic terms. As a result, these terms were dropped from the model. Second, the linear interaction term between pre-test and treatment group membership was examined and found to be non-significant. For this reason, it was also dropped from the model. After dropping this term, the final model revealed a significant main effect, $t(58) = 2.42, p < .01$ for treatment. This result supported the visual analysis of the discontinuity at the cut-off. Regression results for the final model, excluding all three higher-order terms, are displayed on Table 2. All variables were found to be significant. However, when examining the proportion of variance explained, school and pre-test only

contributed less than 1% of unique variance. The effect of teachers, however, contributed 12.9% of the variance. In examining the unique effect of the intervention, it contributed an additional 8.4% of unique variance. This is a medium effect according to Cohen's guidelines (1988, 1992; $R^2 \geq .06$). The model as a whole accounted for approximately 22% of the variance in students' English PA skills.

It is also important to note that prior to the delivery of the intervention, all 19 treatment participants were considered 'at-risk' (i.e., well below benchmark) for reading failure according to DIBELS' standards. Following the intervention, 10 students successfully reached or surpassed the spring benchmark for *PSF* and were considered 'low-risk.' Five students were considered 'some-risk' (i.e., below benchmark), and four students were still 'at-risk' despite their higher post-intervention scores.

Research Question 1b. Visual inspection of the bivariate distribution between students' English PA pre-test scores and students' English phonics post-test scores revealed a moderate discontinuity at the cut-off, suggesting a treatment effect (see Figure2). Adhering to Trochim's (2000) guidelines for RD designs, the proposed model was first examined for linearity. As expected, results of the proposed model revealed non-significant quadratic terms. As a result, these terms were dropped from the model. Second, the linear interaction term between pre-test and treatment group membership was examined and found to be non-significant. For this reason, it was also dropped from the model. After dropping this term, the final model revealed a non-significant main effect for students' English phonics skills. This statistical result did not support the visual analysis of the discontinuity at the cut-off which suggested a treatment effect. Regression results for the final model, excluding all three higher-order terms, are displayed in Table 3.

Research Question 2a. Visual inspection of the bivariate distribution between students' English PA pre-test scores and students' Spanish PA post-test scores revealed a clear discontinuity at the cut-off, suggesting a treatment effect (see Figure3). Adhering to Trochim's (2000) guidelines, the proposed model was first examined for linearity. As expected, results of the proposed model revealed non-significant quadratic terms. As a result, these terms were dropped from the model. Second, the linear interaction term between pre-test and treatment group membership was examined and found to be non-significant. For this reason, it was also dropped from the model. After dropping this term, the final model revealed a significant main effect, $t(58) = 3.14, p < .01$ for treatment. This result supported the visual analysis of the discontinuity

at the cut-off. Regression results for the final model, excluding all three higher-order terms, are displayed in Table 4. Although the effect of pre-test scores and school were not found to be significant, they were retained in the model to serve as control variables. The effect of teachers was a significant control variable contributing approximately 8% of unique variance. Beyond teacher effects, the intervention contributed an additional 14% of unique variance. This is a large effect according to Cohen's guidelines (1988, 1992, $R^2 \geq .14$). The model as a whole accounted for approximately 25% of the variance in students' Spanish PA skills.

It is also important to note that prior to the delivery of the intervention, all 19 treatment participants were considered 'at-risk' (i.e., well below benchmark) for reading failure according to IDEL's standards. Following the intervention, 8 students successfully reached or surpassed the spring benchmark for *FSF* and were considered 'low-risk.' Six students were considered 'some-risk' (i.e., below benchmark), and five students were still 'at-risk' despite their higher post-intervention scores.

Research Question 2b. Visual inspection of the bivariate distribution between students' English PA pre-test scores and students' Spanish phonics post-test scores revealed a clear discontinuity at the cut-off, suggesting a treatment effect. (see Figure4). To examine the statistical significance of this discontinuity, regression analysis was used. First, the proposed model was examined for linearity. As expected, results of the proposed model revealed non-significant quadratic terms. As a result, these terms were dropped from the model. Second, the linear interaction term between pre-test and treatment group membership was examined and found to be non-significant. For this reason, it was also dropped from the model. After dropping this term, the final model revealed a significant main effect, $t(58) = 2.20, p < .05$ for treatment. This result supported the visual analysis of the discontinuity at the cut-off. Regression results for the final model, excluding all three higher-order terms, are displayed on Table 5. Pre-test scores did not have a significant effect on students' Spanish phonics skills. The remaining variables, however, were found to be significant. Teacher differences accounted for approximately 11% of unique variance in students Spanish phonics skills. School, however, contributed less than 1% of unique variance although it was statistically significant in the model. Beyond teacher and school effects, the intervention contributed an additional 7% of unique variance. This is a medium effect according to Cohen's guidelines (1988, 1992;

$R^2 \geq .06$). The entire model accounted for approximately 21% of the variance in students' Spanish phonics skills.

Research Question 3. Growth rates (i.e., slope values) were calculated for each student in the treatment group for both PA and phonics in each language. Growth rates for each student were calculated using the least squares criteria (refer to Table 6). This method was selected because it has been shown to produce the most accurate estimates of growth compared to other methods (e.g. visual analysis, split-middle approach; Good & Shinn, 1990; Shinn, Good, & Stein, 1989). To address whether there was a difference in the growth on English vs. Spanish measures of PA and phonics, a dependent samples t-test was conducted revealing no significant differences between growth rates for students skills in English and Spanish PA $t(18)=-2.0, p=0.06$. The same result was found for students' phonics skills in English and Spanish $t(18)=0.59, p=0.56$.

Research Question 4. Treatment integrity was measured for half of the intervention sessions delivered (i.e., 13 of the 26 lessons). The data revealed that the intervention was delivered with a high degree of integrity by both interventionists. The principal investigator delivered the intervention with 98% integrity and the assisting graduate student delivered the intervention with 97% integrity.

Discussion

Limited research has examined the effects of PA interventions delivered in a student's native language with ELs who receive general instruction in English. Most of the early literacy research has focused on interventions that are delivered in the same language as the general curriculum in an effort to strengthen students' foundational reading skills in one language (Vaughn et al., 2006a; Vaughn et al., 2006b). For this reason, more research is needed to further explore the development of PA in Spanish-speaking ELs. A PA intervention delivered in Spanish that is found to increase students' PA skills in English would provide preliminary support for providing Spanish-speaking ELs with a PA intervention in their native language rather than providing it solely in English. This would have potentially important implications for ELs from families who solely speak Spanish. A large number of today's ELs live in homes with adults who are also ELs (Capps et al., 2005). Thus, an effective phonological intervention

delivered in Spanish would indicate that families could potentially provide literacy support in the home either prior to their child's entry into school or throughout the school year.

In order to address the aforementioned limitations in the literature, the purpose of this study was to examine the effectiveness of a Spanish PA intervention on students' English and Spanish reading skills, examine any differences in intervention students' growth on English versus Spanish measures of reading, and examine the degree to which the intervention could be delivered with integrity. In the current study, 20 kindergarten ELs who received English general literacy instruction participated in the Spanish PA intervention. Each intervention session was 30 minutes and was conducted three days a week for 9 weeks.

The purpose of this study was driven by previous research indicating that PA skills transfer between languages (Quiroga et al., 2002). Specifically, the strongest transfer of these skills has been noted among languages with similar alphabet systems such as English and Spanish (Cisero & Royer, 1995; Durgunoglu et al., 1993; Quiroga et al., 2002). Various studies have found that the development of Spanish PA among Spanish-speaking ELs not only results in higher Spanish literacy skills, but also produces higher English literacy skills including both PA and phonics (Cisero & Royer, 1995; Durgunoglu et al., 1993). Such research supports the theoretical model of this present study, which posits that Spanish PA is related to both English and Spanish literacy skills. Specifically, the model hypothesizes that increasing Spanish PA skills would have a positive effect on students' Spanish and English literacy skills. The present analysis revealed several noteworthy findings discussed below.

Effect of Intervention on English PA. With respect to the effectiveness of the intervention on students' English PA skills, visual analysis revealed a clear discontinuity at the cut-off. The use of a RD design further supported this result, revealing a significant main effect for treatment. This suggests that the actual performance of the treatment participants was statistically different from what was expected had the participants not received the intervention. In Figure 1, the dotted line represents the expected performance of the treatment participants without treatment. As hypothesized, the *actual* performance of the at-risk intervention participants was higher than what was expected had the students not received the intervention. This is indicated by the solid black line in the "intervention" region of the graph. Results also indicated that the effect of treatment did not vary by students' pre-intervention PA skills given that the interaction

term was not statistically significant. The following variables were included in the final model: school, teacher, pre-test, and group. Differences in school, teacher, and modified pre-test variables were all found to be statistically significant (see Table 2). This suggests that even after controlling for these covariates, a main effect for the intervention was still found. This indicates that beyond the effects of school differences, teacher differences, and pre-intervention PA scores, the intervention still had an effect on students' English PA skills.

The cross-language transfer effect of Spanish PA skills on English PA skills found in this study is consistent with the literature. Over the past twenty years, it has been well established that PA skills transfer between languages (Cisero & Royer, 1995; Durgunoglu et al., 1993; Quiroga et al., 2002). Cummins (1979) describes this cross-language transfer effect by proposing that the acquisition of a second language (e.g. English) in part depends on the adequate development of a student's native language (e.g. Spanish) during the time that the student is being exposed to the second language. In short, Cummins states that highly developed native language skills results in the strong development of second language skills (Cummins, 1979). Research examining the cross-language transfer effect of English and Spanish PA skills among ELs provides ample support for Cummins' (1979) hypothesis, which has been particularly well documented among young native Spanish speakers (Lindsey et al., 2003). In one study, PA skills were found to transfer from Spanish to English among kindergarten students (Lindsey et al., 2003). Another study found that first grade students' performance on a phoneme task in Spanish significantly predicted their performance on a similar phoneme task in English (Cisero & Royer, 1995). Dickinson et al. (2004) further supported these results, indicating that PA skills among preschool children transferred across both Spanish and English. Similar to these findings, the results of this current study provides support for the cross-language transfer of Spanish PA skills to English PA skills.

Effect of Intervention on English Phonics. With respect to the effectiveness of the intervention on students' English phonics skills, there was a disparity between the visual and statistical analysis. While the visual analysis revealed some discontinuity at the cut-off, suggesting a treatment effect, statistical analysis did not reveal a significant main effect. This suggests that while the actual performance of the treatment participants was slightly higher than expected had the participants not received the intervention,

this performance was not statistically significant. The lack of a cross-language transfer effect of Spanish PA skills on English phonics skills is inconsistent with previous research. As previously discussed, there is research to support that Spanish PA predicts both Spanish and English pseudo and real word reading (Durgunoglu et al., 1993; Quiroga et al., 2002). However, the result of this study did not reveal such an effect. This finding may have occurred as a result of the phonological complexity of the English language and its orthographic inconsistency. According to Goswami (2005), children acquire phonics skills more rapidly when the phonological structure of their language is aligned with a consonant-vowel (CV) structure (e.g., Spanish). English does not have a CV syllable structure. There are a limited number of words based on the CV syllable structure. The most frequent syllable type is CVC (e.g., cat). The nonsense words on the English probes used to assess participants in this study followed the most frequent syllable structure (i.e., CVC).

Secondly, the letter-sound correspondence in the English language is very inconsistent. One letter can have multiple pronunciations, and one phoneme can have multiple spellings. It is much easier for a child to learn about the spoken units of their language if one letter consistently corresponds to one phoneme and vice versa. A large-scale study conducted in Europe supports this idea. Data were obtained from children who were receiving their first year of reading instruction in 14 European languages. Students were asked to read real words and pseudo words in their respective language. Results revealed that children who were receiving reading instruction in languages with consistent spelling (e.g., Spanish) performed better than children from English speaking countries, regardless of age (Seymour, Aro, & Erskine, 2003). Children learning to read in English were less accurate readers. Finnish children, for instance, who begin schooling at the age of 7, were reading with 90% accuracy by the 10th week of school. English children, on the other hand, who begin school at age 4 or 5, struggled to reach the same amount of accuracy (Goswami, Gombert, & De Barrera, 1998; Seymour et al., 2003). Other studies have supported these findings revealing that children who are learning to read in Spanish and Welsh learn to read faster than children who are learning to read in English (Goswami et al., 1998; Hanley, Masterson, Spencer, & Evans, 2004). This suggests that learning to read in a language that is more orthographically consistent (e.g., Spanish) is easier than learning to read in a language that is orthographically inconsistent (e.g., English; Goswami, 2005).

Effect of Intervention on Spanish PA and Phonics. With respect to the effectiveness of the intervention on students' early literacy skills in Spanish, results revealed significant main effects of treatment for both Spanish PA and phonics skills. As hypothesized, this suggests that the actual performance of the treatment participants was different from what was expected had the students not received the intervention. In Figures 3 and 4, the dotted line represents the expected performance of the treatment participants without treatment. These figures indicate that the actual performance of the at-risk intervention participants was higher than predicted for both Spanish PA and phonics skills. Results also indicated that the effect of treatment did not vary by students' pre-test scores for either PA or phonics, given that there was no significant interaction. This suggests that the intervention was as effective for all students regardless of whether some students had higher pre-test scores than others. The final models included the following variables: school, teacher, pre-test, and group. These models indicated that even after controlling for the covariates, a main effect was still found for the intervention. The effect of the intervention on Spanish reading skills was expected and consistent with the literature. Vaughn et al. (2006b) found that students who received Spanish intervention made gains in their Spanish reading skills. In another study, Quiroga et al. (2002) found that Spanish PA skills predicted Spanish pseudo word reading among native Spanish-speaking kindergarteners receiving general reading instruction in English.

Growth on English vs. Spanish Reading Measures. In order to further examine the effect of the Spanish PA intervention on reading skills in both languages, student growth rates on both English and Spanish reading measures were compared. Results revealed no significant difference between students' growth on English vs. Spanish measures of PA and phonics. Although the mean growth rate was slightly higher for students' Spanish skills, this difference was not statistically significant. Although significant differences were not found, this finding needs to be interpreted with caution because it is unknown as to whether English and Spanish literacy skills should be expected to grow at the same rate.

Treatment Integrity. Regarding intervention implementation, the present analysis revealed that the intervention could be delivered with integrity. This was expected given that the intervention was designed to be easily implemented. More specifically, the data revealed that the intervention was delivered with a high degree of integrity by both interventionists. One interventionist delivered the intervention with

98% integrity and the other interventionist delivered the intervention with 97% integrity. Fifty percent of the sessions were observed for integrity.

Limitations. Although this study revealed positive findings, three main limitations were present. First, the sample size and demographics limits the generalizability of these results. The final sample of students whose data were analyzed consisted of 59 Spanish-speaking ELs selected from three low-performing urban schools in one school district. Therefore, the results of this study can be generalized to other Spanish-speaking ELs from similar demographic backgrounds. Additional research is warranted regarding the generalizability of these results to ELs from other language backgrounds. In order to gain further understanding on the cross-language transfer of PA and effects of intervention delivered in a student's native language, future research can explore the effect of such an intervention with ELs from various language backgrounds.

A second limitation to this study addresses the degree of comparability between English growth rates and Spanish growth rates for research question 3. Although significant differences were not found between English and Spanish measures, this finding needs to be interpreted with caution because it is unknown as to whether English and Spanish literacy skills should be expected to grow at the same rate. Although normative data exist for English growth rates for PA and phonics, Spanish growth rates have not yet been established. For this reason, students' growth rates cannot be compared.

A third limitation of this study is that the direct observation method used to collect treatment integrity data may have contributed to the high levels of integrity. While direct observation can result in accurate measurement of intervention integrity, observer reactivity may have resulted (Fiske, 2008). Observer reactivity refers to the inflation of usual levels of integrity due to the presence of an observer (Kazdin, 1979). According to Brackett, Reid, and Green (2007), degree of integrity tends to increase when interventionists are aware that they are being observed. On the other hand, unobtrusive observations more often result in lower levels of treatment integrity. For this reason, researchers have suggested that more inconspicuous and unscheduled observations should be used to help reduce observer reactivity and increase the accuracy of treatment integrity data (Fiske, 2008). For the present study, unobtrusive observations were not possible given that most of the intervention participants were removed from their general education

classroom and placed in a nearby empty classroom. For this reason, the interventionist was always aware whenever treatment integrity data were being collected.

Implications. Despite these limitations, the present study contributes to the existing literature in the area of literacy for ELs. More specifically, the results of this study suggest that young Spanish dominant students with low levels of English proficiency who are immersed in English-only classrooms can make gains following a relatively short-term PA intervention in their native language. The results of this study revealed that students' early literacy skills transferred between languages, which resulted in increased literacy skills in both languages. Prior to the delivery of the intervention, all 19 students were considered 'at-risk' (i.e., well below benchmark) for reading failure according to DIBELS' and IDEL's standards. Following the intervention, 10 students successfully reached or surpassed the spring benchmark for *PSF* and were considered 'low-risk.' Five students were considered 'some-risk' (i.e., below benchmark), and four students were still 'at-risk' despite their higher post-intervention scores. For IDEL's *FSF*, 8 of the 10 students who successfully reached or surpassed the spring benchmark for *PSF* also met or surpassed the spring benchmark goal. Six students were considered 'some-risk,' some of whom were also considered 'some-risk' according to DIBEL's *PSF*. Five were considered 'at-risk' despite their higher post-intervention scores. Two of these 5 students were also considered 'at-risk' according to IDEL's *PSF*. These findings are particularly important because it demonstrates that literacy instruction in English can be supplemented with an intervention in a child's native language (i.e., Spanish) to help improve their literacy skills. This has important implications given the expected increase of in the number of EL students in the United States.

Results of the present study also provide important implications for school educators with respect to the implementation of RtI with young Spanish-speaking ELs. As indicated by the results of this study, an RtI approach can effectively improve the literacy outcomes for ELs. This is consistent with previous studies that have found that students can be screened for reading difficulties as early as kindergarten (Dion et al., 2010; Vellutino et al., 2006) or first grade (Vellutino et al., 1998). Students identified as at-risk can then benefit from targeted reading intervention (Al Otaiba and Torgesen, 2007; Dion et al., 2010; Torgesen et al., 1999; Vellutino et al., 1998; Vellutino et al., 2006). Additionally, it is not necessary to wait to

intervene with ELs. Research has shown that early reading skills, such as PA, can be assessed among EL children as young as kindergarten (O'Connor et al., 2010) to obtain critical information about their reading levels even while their English language skills are developing.

Furthermore, the results of this study could have implications for families of ELs who only speak Spanish. As previously mentioned, a large majority of ELs live in homes with adults who are also ELs (Capps et al., 2005). Given that this study resulted in positive outcomes for young school-aged ELs, future research could explore the possibility of developing a parent component. Parents and family members could potentially provide literacy support in the home prior to their child's entry into school or even throughout the school year. This is particularly important given that certain aspects of the home environment, such as family literacy involvement, have been found to influence students' future reading achievement (Storch & Whitehurst, 2001). PA skills, in particular, could be taught and further developed in their native language by presenting children with a number of oral language activities (e.g. rhymes, tongue twisters; Yopp & Stapleton, 2008). Such activities are likely to strengthen students' literacy skills in their native language, and in English.

Lastly, and perhaps more importantly, a high quality research design (i.e., RD) was used in this study. Such a design could easily be used in schools to evaluate interventions when random assignment is not possible. As previously mentioned, RD is a two group pre-test post-test model that has some of the scientific qualities of a randomized experiment. It is also aligned with accepted clinical practice. The use of a RD design allows the researcher to control the assignment of the intervention. In doing so, the researcher is able to make a more valid assessment of the effectiveness of the intervention. Additionally, subjects who need treatment are able to receive it, rather than deny some subjects the support needed.

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Table 1

Participant and School Demographic Characteristics

	School 1	School 2	School 3
Number of Students Served	751	624	792
Academic Performance Index	3	4	2
Number of Students in Sample			
Treatment	5	5	10
Comparison	15	10	15
Gender			
Treatment			
Male	3	3	5
Female	2	2	5
Comparison			
Male	10	5	6
Female	5	5	9
California English Language Development (CELDT)			
Treatment			
Level 1	3	5	7
Level 2	2	0	1
Level 3	0	0	2
Comparison			
Level 1	6	5	7
Level 2	4	5	6
Level 3	5	0	2
Free/Reduced Lunch Qualifiers (%)			
Sample (Treatment & Comparison)	88	82	96
Entire school	84	88	94

Note. The Academic Performance Index (API) is used to measure school performance. In California, all schools are categorized according to type (elementary, middle, high) and are placed on a scale of 1-10, with 10 representing the highest rank. The API scores reported here represent the statewide rank. The CELDT scores listed are as follows: Level 1-Beginning, Level 2-Early Intermediate, and Level 3-Intermediate.

Table 2

Regression Results for the Final Model for Students' English PA Skills

Predictor	Coefficient	Std. Error	t-ratio	p-value
Constant	45.68	8.87	5.15	.00
School	-27.21	10.94	-2.49	.01
Teacher	7.64	3.14	2.44	.01
Pre-test	0.41	0.19	2.16	.04
Group	15.64	6.48	2.42	.01

Note. The coefficients reported above are the unstandardized coefficients. The final model consisted of the following: $y_i = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + \beta_3 x_i^* + \beta_4 z_i + e_i$, where y_i = outcome measure for individual i (i.e., scores on DIBELS PSF), β_0 = y-intercept for the comparison group regression line at cutoff, β_1 = coefficient associated with the covariate (school), x_1 = covariate (school), β_2 = coefficient associated with the covariate (teacher), x_2 = covariate (teacher), β_3 = slope parameter, x_i^* = pre-test measure for individual i minus the value of the cut-off, x_0 (i.e., $x_i^* = x_i - x_0$), β_4 = treatment effect estimate (i.e., main effect), z_i = assignment variable (1 if treatment participate; 0 if comparison participant), and e_i = random error for individual i .

Table 3

Regression Results for the Final Model for Students' English Phonics Skills

Predictor	Coefficient	Std. Error	t-ratio	p-value
Constant	29.17	6.03	4.84	.00
School	-10.79	7.43	-1.45	.15
Teacher	3.48	2.13	1.63	.11
Pre-test	0.23	0.13	1.77	.08
Group	5.39	4.40	1.23	.23

Note. The coefficients reported above are the unstandardized coefficients. The final model consisted of the following: $y_i = \beta_0 + \beta_1x_1 + \beta_2x_2 + \beta_3x_i^* + \beta_4z_i + e_i$, where y_i = outcome measure for individual i (i.e., scores on DIBELS NWF), β_0 = y-intercept for the comparison group regression line at cutoff, β_1 = coefficient associated with the covariate (school), x_1 = covariate (school), β_2 = coefficient associated with the covariate (teacher), x_2 = covariate (teacher), β_3 = slope parameter, x_i^* = pre-test measure for individual i minus the value of the cut-off, x_0 (i.e., $x_i^* = x_i - x_0$), β_4 = treatment effect estimate (i.e., main effect), z_i = assignment variable (1 if treatment participate; 0 if comparison participant), and e_i = random error for individual i .

Table 4

Regression Results for the Final Model for Students' Spanish PA Skills

Predictor	Coefficient	Std. Error	t-ratio	p-value
Constant	36.90	9.19	4.01	.00
School	-22.24	11.33	-1.96	.06
Teacher	7.04	3.25	2.17	.04
Pre-test	0.29	0.20	1.45	.15
Group	21.05	6.71	3.14	.00

Note. The coefficients reported above are the unstandardized coefficients. The final model consisted of the following: $y_i = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + \beta_3 x_i^* + \beta_4 z_i + e_i$, where y_i = outcome measure for individual i (i.e., scores on DIBELS FSF), β_0 = y-intercept for the comparison group regression line at cutoff, β_1 = coefficient associated with the covariate (school), x_1 = covariate (school), β_2 = coefficient associated with the covariate (teacher), x_2 = covariate (teacher), β_3 = slope parameter, x_i^* = pre-test measure for individual i minus the value of the cut-off, x_0 (i.e., $x_i^* = x_i - x_0$), β_4 = treatment effect estimate (i.e., main effect), z_i = assignment variable (1 if treatment participate; 0 if comparison participant), and e_i = random error for individual i .

Table 5

Regression Results for the Final Model for Students' Spanish Phonics Skills

Predictor	Coefficient	Std. Error	t-ratio	p-value
Constant	27.52	5.30	5.19	0.00
School	-17.65	6.53	-2.70	0.01
Teacher	5.02	1.87	2.68	0.01
Pre-test	0.05	0.11	0.41	0.69
Group	8.49	3.87	2.20	0.03

Note. The coefficients reported above are the unstandardized coefficients. The final model consisted of the following: $y_i = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + \beta_3 x_i^* + \beta_4 z_i + e_i$, where y_i = outcome measure for individual i (i.e., scores on DIBELS FPS), β_0 = y-intercept for the comparison group regression line at cutoff, β_1 = coefficient associated with the covariate (school), x_1 = covariate (school), β_2 = coefficient associated with the covariate (teacher), x_2 = covariate (teacher), β_3 = slope parameter, x_i^* = pre-test measure for individual i minus the value of the cut-off, x_0 (i.e., $x_i^* = x_i - x_0$), β_4 = treatment effect estimate (i.e., main effect), z_i = assignment variable (1 if treatment participate; 0 if comparison participant), and e_i = random error for individual i .

Table 6

Individual Growth Rates

Student	English PA	Spanish PA	English phonics	Spanish phonics
1	2.51	2.58	1.07	0.86
2	2.13	4.12	1.85	2.06
3	4.5	3.09	1.7	1.18
4	0.33	0.05	0.88	0.5
5	0.87	3.97	1.74	1.9
6	5.63	4.46	1.15	1.3
7	6.19	6.21	1.84	1.8
8	6.36	7.37	1.22	2.04
9	2.75	3.05	1.48	1.96
10	1.57	2.25	2.02	1.3
11	0.37	0.27	1.42	1.2
12	1.7	1.62	1.75	1.3
13	5.08	6.7	0.86	1.31
14	3.48	6.15	3.24	3.08
15	1.95	2.06	0.81	1.19
16	5.25	4.54	2.03	1.47
17	7.83	8.7	2.81	1.76
18	4.67	7.22	1.16	1.75
19	6.86	6.79	1.45	1.26

Note. Growth rates for each student were calculated using the least squares criteria (Good & Shinn, 1990; Shinn, Good, & Stein, 1989). Eleven data points were used to calculate growth except for three students, two of whom were missing one data point (students 1 and 4) and one of whom was missing 2 data points (student 2). For these students, growth rates were calculated with the number of data points available.

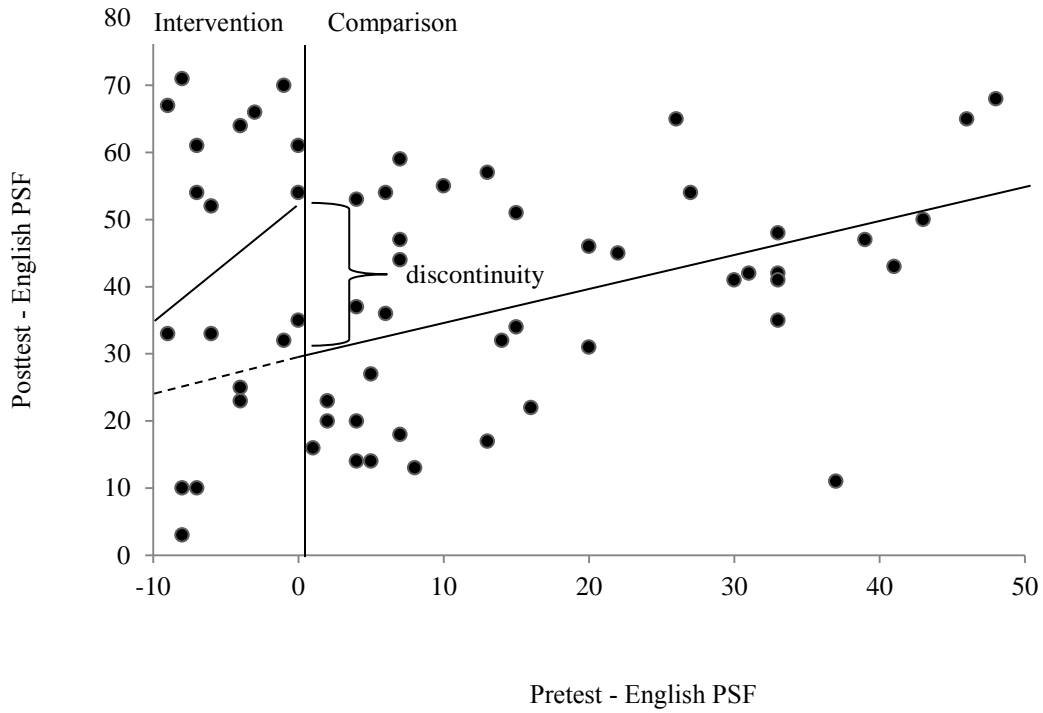


Figure 1. Bivariate distribution between the selection variable and outcome variable. The discontinuity in the regression line indicates a treatment effect. Note that the cutoff score has been adjusted to zero to better depict the data.

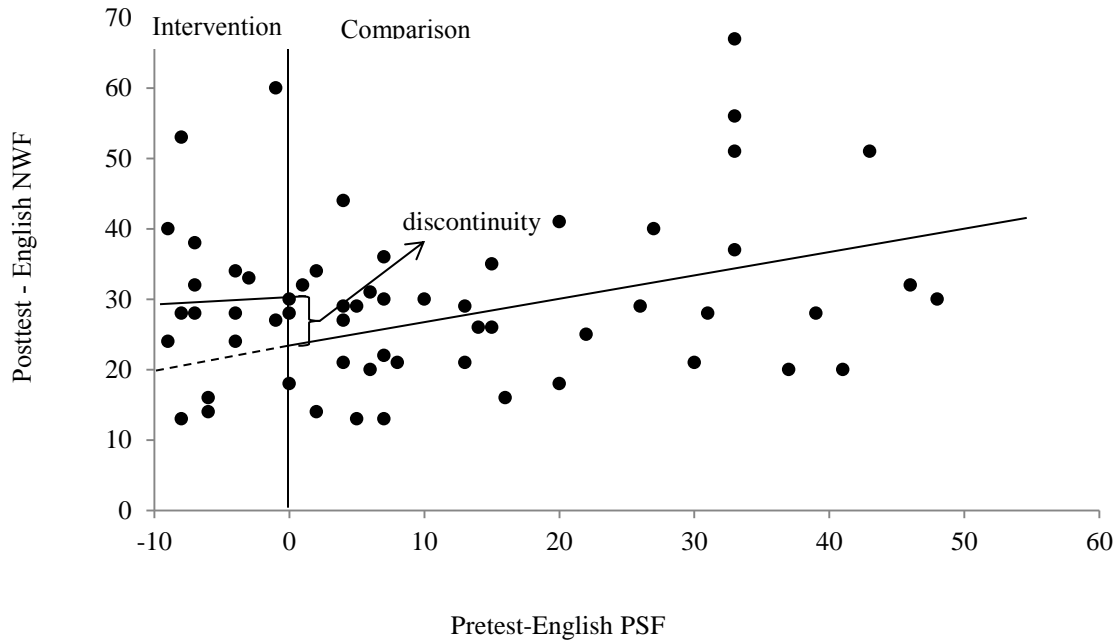


Figure 2. Bivariate distribution between the selection variable and outcome variable. Visual analysis suggests a treatment effect, however, statistical analysis revealed no treatment effect. Note that the cutoff score has been adjusted to zero to better depict the data.

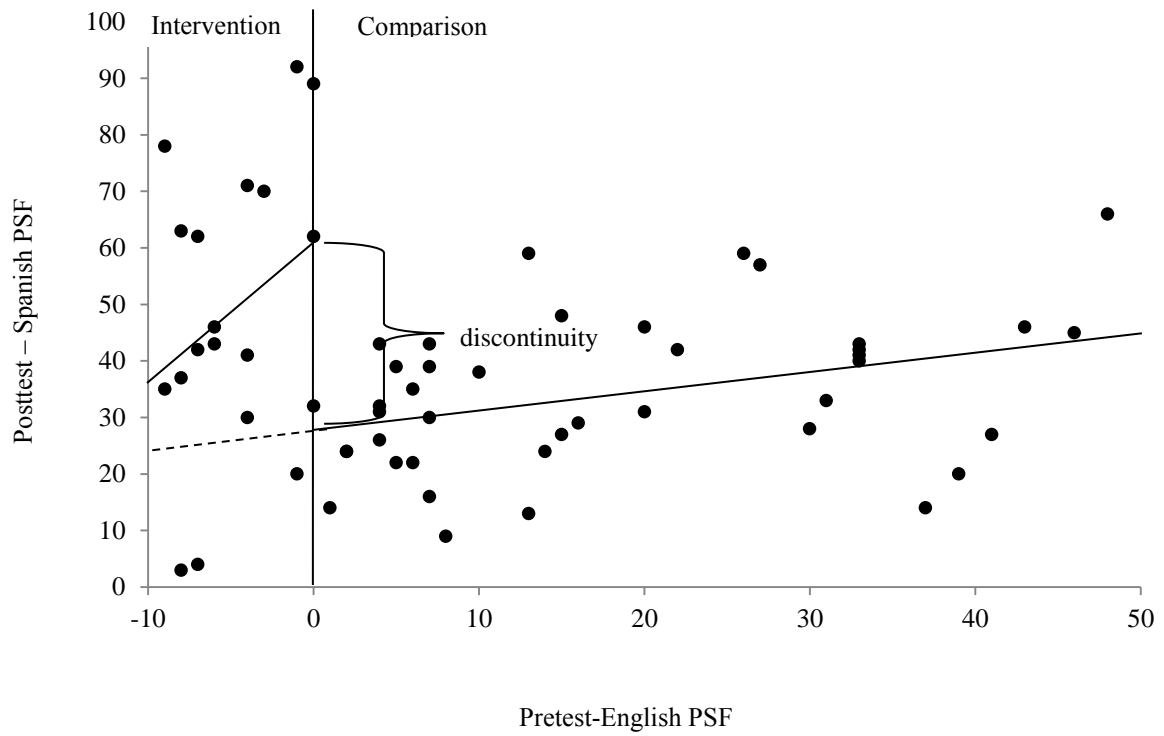


Figure 3. Bivariate distribution between the selection variable and outcome variable. The discontinuity in the regression line indicates a treatment effect. Note that the cutoff score has been adjusted to zero to better depict the data.

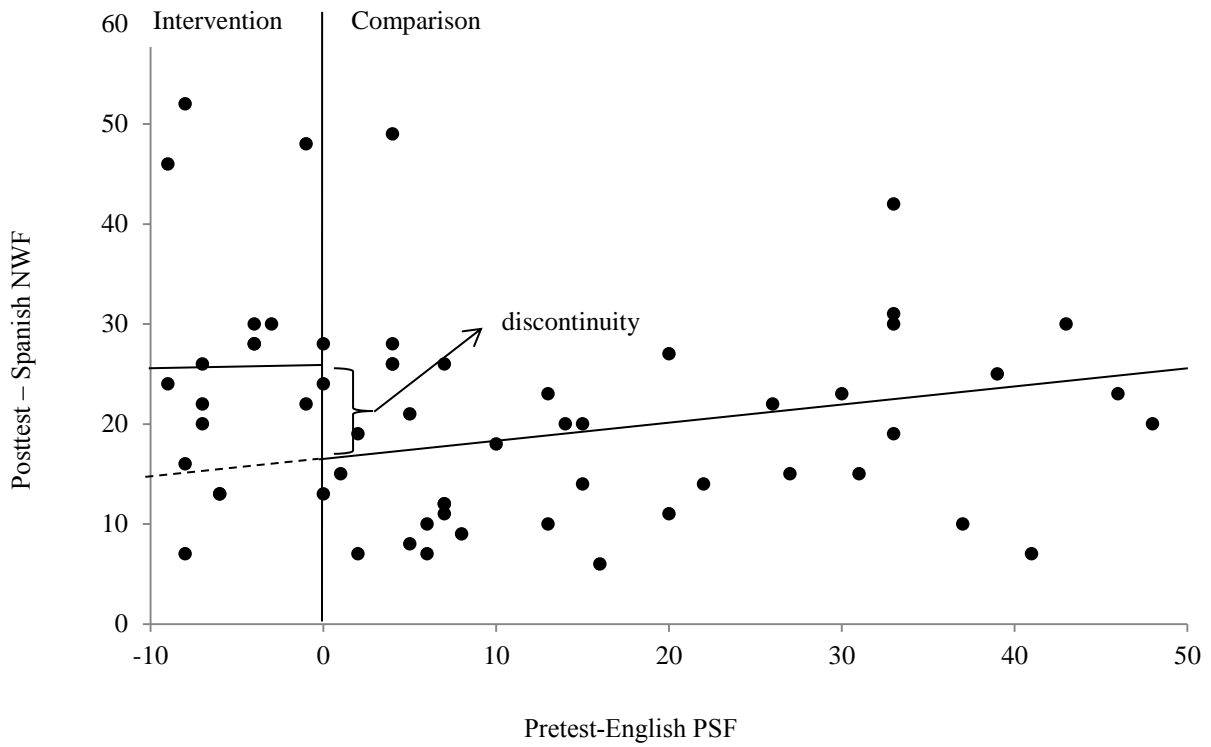


Figure 4. Bivariate distribution between the selection variable and outcome variable. The discontinuity in the regression line indicates a treatment effect. Note that the cutoff score has been adjusted to zero to better depict the data.