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# The Influence of Language Preference on Bilingual Children's Expressive and Receptive Vocabulary and Reading Ability

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THE INFLUENCE OF LANGUAGE PREFERENCE ON BILINGUAL CHILDREN'S  
EXPRESSIVE AND RECEPTIVE VOCABULARY AND READING ABILITY

by

CORTNEY MILLER FRITZ

Under the Direction of Robin D. Morris

ABSTRACT

Given the increase of Spanish- and English-speaking bilingual students in US schools, identifying the predictors of reading in this group of students is of significant importance to developing appropriate screening measures and intervention strategies. Thus, the current study evaluated the pattern of language preference in an elementary school bilingual (Spanish-English) population and its relationship with expressive and receptive vocabulary, and broad reading ability in English and Spanish. Participants were 58 Latino students ranging in age from 7 years, 5 months to 11 years, 1 month ( $M = 8.98$ ,  $SD = .98$ ) with 48% born in the United States. Results indicated that English expressive vocabulary partially mediated the relationship between outside language preference and English broad reading ability. In contrast, neither Spanish expressive nor receptive vocabulary mediated the relationship between outside language preference and Spanish broad reading ability.

INDEX WORDS: Bilingual students, Language preference, Reading ability, Receptive vocabulary, Expressive vocabulary, Psycholinguistic grain size theory

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CORTNEY MILLER FRITZ

A Thesis Submitted in Partial Fulfillment of the Requirements for the Degree of

Master of Arts

in the College of Arts and Sciences

Georgia State University

2011

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## 1 INTRODUCTION

### 1.1 Purpose of the Study

#### *Bilingual Students*

The population of bilingual students in American schools has increased significantly in recent years. Nationally, the number of school-age children who spoke a language other than English at home increased from 4.7 million students in 1980 to 11.2 million students in 2009, which equates to an increase from 10 to 21 percent of the school-age population (National Center for Education Statistics [NCES], 2011). Of all bilingual students, 2.7 million spoke English with difficulty (NCES, 2011). Seventy-three percent of these students spoke English and Spanish (NCES, 2011). Many Latino students, similar to other disadvantaged minority groups, read below expectations (Cambell, Hombo & Mazzeo, 1999). According to the National Assessment of Educational Progress (NAEP, 2009), 71% of English Language Learner (ELL) fourth grade students in the United States scored below basic level in reading, and 74% in the eighth grade. This achievement gap in reading skills exists from kindergarten onward (Brice & Brice, 2009), and certainly contributes to the 21.4% high school dropout rate for Latino students in the United States (NCES, 2009). Despite significant research about the development of reading in monolingual English-speaking students, surprisingly little is known about the factors that influence reading development in bilingual students. Thus, identifying the predictors of reading development in students who speak both English and Spanish, the largest segment of bilingual students in US schools, is of significant importance to developing appropriate screening measures and intervention strategies.

#### *Language Preference*

Recent research suggests that some of the variance in reading ability may be attributed to bilingual students' language preference (Brenneman, Morris, & Israelian, 2007; Ledesma & Morris, 2005). Little is known about the relationship though between language preference and literacy development in bilingual children. Research has established that language preference for bilingual children varies across environments. In a study of Mexican-American middle school students, Marsiglia

and Waller (2002) found that although bilingual students' language preferences differed across environments (e.g., home, friends, and media), they spoke Spanish most at home. Similarly, Filipino- and English-speaking bilingual elementary students in the Philippines preferred English for media, school-related communication, and religion but preferred Filipino for communication with friends and family (Ledesma & Morris, 2005).

Historically, researchers have operationalized language preference, or the usage of a language or combination of languages in a social context, in different ways. Older research examined language preference as a categorical variable. For example, Umbel, Pearson, Fernandez, and Oller (1992) divided bilingual students into two groups: Spanish-speaking at home and Spanish- and English-speaking at home. However, this strategy discounts the dynamic language use patterns of bilingual individuals, particularly across context. Furthermore, Umbel et al. failed to provide a description of the methods for establishing this categorical language preference.

More recently, Duursma, Romero-Contreras, Szuber, Proctor and Snow (2007) developed a 5-point scale of language preference that ranged from use of only Spanish to use of only English for a child and his or her mother, father, and siblings. Specifically, parents reported the language used from parent to child, and from child to parent, as well as parent preferred reading language. The researchers also looked at the language used from siblings to child and from child to siblings. This strategy provided detailed information about students' language preference with specific family members, but failed to address the complexity of language preference patterns inside and outside of the home.

To address this, Brenneman et al. (2007) also used a 5-point scale to rank variations in language preference for Spanish and English, but expanded the scope of student language preference to a variety of social contexts (e.g., media, school, etc.) and to individuals inside and outside of the family. Factor analysis revealed two factors: home and non-home environments. The bilingual students had a strong preference for speaking Spanish at home and a more varied preference for English and Spanish outside of the home. Interestingly, home language preference did not predict any literacy outcomes in this population of bilingual elementary students. Thus, to capture the greatest information about students'

language preference, this study will focus primarily on language preference outside of the home environment while accounting for the effects of home language preference.

### *Language Preference and Reading*

Not only do bilingual students vary in language preference across context, they also vary in development of reading skills in each language (e.g., Brenneman et al., 2007; Gorostiaga & Balluerka, 2002; Ledesma & Morris, 2005). According to the psycholinguistic grain size theory, phonological awareness is a central component to reading development across languages (Ziegler & Goswami, 2005). However, languages vary in the consistency of phonology, the mapping of symbols and sounds, and orthography, the representation of symbols. Spanish, for example, is orthographically and phonologically consistent, whereas English is orthographically and phonologically inconsistent. These orthographic and phonologic differences influence the reading strategies that children develop. Because of the consistency of grapheme-phoneme relationships in Spanish, children learning to read Spanish can rely on this system. Yet, because of the irregularity of grapheme-phoneme relationships in English, children cannot rely primarily on this strategy and must develop other strategies for reading. Not only does the consistency of orthography and phonology in a language influence the reading strategies children develop, but for bilingual children there are also important relationships between each of the languages they speak.

Ledesma and Morris (2005) established that bilingual students' decreased use of one language promoted increased reading comprehension of the other language. More specifically, English language preference in both family and media/school situations was related to better English reading comprehension. In general, language preference predicted levels of English reading comprehension, whereas phonological awareness and rapid naming skills predicted reading decoding skills in both languages (Ledesma & Morris, 2005). Similarly, Gorostiaga and Balluerka (2002) found that social and long-term language use of either Euskera or Castilian predicted reading comprehension in that language for high school and college students.

Examining the bilingual reading skills of English- and Spanish-speaking students, Brenneman et al. (2007) found a positive relationship between a child's higher English language preference for

communication with others outside the family and better English word reading and reading comprehension skills. However, no relationship between language preference and Spanish reading abilities was established. The students in this study received reading instruction in only English, which the authors suggest may account for the inability of language preference to predict Spanish reading ability. However, because Brenneman et al. (2007) only examined language preference in relation to word reading and passage comprehension, it is not known whether this relationship exists with more reliable and comprehensive measures of reading achievement, such as broad reading ability, which measures decoding, reading speed and reading comprehension.

### *Oral Language Abilities*

Although Brenneman et al. (2007) found no relationship between preferred language use and Spanish reading outcomes, other researchers have established relationships between oral language and reading abilities in bilingual speakers of English and Spanish, as well as other languages. In a study of 1,531 Spanish- and English-speaking bilingual students attending kindergarten through third grade, measures of oral language in Spanish predicted reading comprehension and word reading abilities in Spanish, just as measures of oral language in English predicted reading comprehension and word reading ability in English (Miller et al., 2006).

Miller et al (2006) and other researchers have suggested that reading skills not only transfer within languages, but also across languages for bilingual students (e.g., Anthony et al., 2009; Cardenas-Hagan, Carlson, & Pollard-Durodola, 2007; Proctor, August, Carlo, & Snow, 2006; Swanson, Rosston, Gerber & Solari, 2008). For bilingual elementary students, measures of oral language in one language predict reading comprehension and word reading in a second language beyond the effects of grade and oral language measures in the second language (Miller et al., 2006). Specifically, English oral language measures account for an additional 6 percent of the variance in Spanish reading comprehension, just as Spanish oral language measures account for an additional 2 percent of the variance in English reading comprehension. Similarly, Spanish oral language measures account for an additional 3 percent of the

variance in English word reading, just as English oral language measures account for an additional 1 percent of the variance in Spanish word reading.

In bilingual students speaking languages other than Spanish and English, the relationship between oral language and reading comprehension in first (L1) and second languages (L2) has also been studied. Specifically, Toloa, McNaughton, and Lai (2009) found a strong relationship between L1 (Samoan) oral language levels and L1 reading comprehension, but no relationship between L1 oral language levels and L2 (English) reading comprehension levels. However, there was a positive relationship between L1 and L2 reading comprehension suggesting that some of the skills required for reading are transferred between languages.

In addition to a transfer of oral language and reading skills across languages, research suggests a transfer of vocabulary and reading skills. For example, Proctor et al. (2006) found that Spanish expressive vocabulary positively predicted English reading comprehension in 4<sup>th</sup> grade bilingual students after accounting for language of initial literacy instruction as well as English alphabetic knowledge, fluency, expressive vocabulary, and listening comprehension. However, not all research has found a relationship across languages for vocabulary and reading skills in bilingual students. Using a composite vocabulary variable combining expressive and receptive vocabulary, Swanson et al. (2008) found no relationship between Spanish vocabulary and various English reading skills (e.g., word reading, word attack, and reading comprehension) or between English vocabulary and Spanish reading tasks. However, when separately examining the effects of Spanish receptive and expressive vocabulary on English reading tasks, Spanish expressive vocabulary negatively predicted scores on the three English reading measures. These negative relationships were only significant, though, when the researchers did not account for measures of English oral language or phonological skills. Furthermore, Swanson et al. (2008) failed to report the relationship between English expressive and receptive vocabulary with Spanish reading tasks.

#### *Language Preference and Vocabulary*

Not only does language preference influence bilingual reading, but researchers also suggest that it impacts the development of vocabulary in each language. However, much of the research on language

preference and vocabulary development in bilingual children has been conducted on very young populations. For example, Patterson (2002) found that the expressive vocabulary, or the ability to formulate and produce language, in 1- and 2-year olds from Spanish- and English- bilingual homes was related to the frequency of being read to in that language. The same was not true of television watching, which did not predict vocabulary size in either language.

Two studies have evaluated the impact of language preference on vocabulary in bilingual elementary students. First, a study of language preference in fifth grade bilingual students examined the predictors of English and Spanish expressive vocabulary by language of initial instruction (Duursma et al., 2007). Specifically, for students initially instructed in English, literacy and homework support in English predicted English expressive vocabulary, and mother and father preference for Spanish predicted Spanish expressive vocabulary. For the students initially instructed in Spanish, girls, and students whose fathers spoke more English, had higher English expressive vocabulary, and students whose siblings preferred speaking in Spanish had higher Spanish expressive vocabulary. Although this research examined the impact of home language preference on expressive vocabulary, little is known about the relationship between outside language preference and both expressive and receptive vocabulary, or the ability to understand language.

Umbel et al. (1992) examined the relationship between receptive vocabulary and language preference in first grade students. They found no differences in Spanish receptive vocabulary between students categorized as speaking only Spanish at home, and those categorized as speaking both English and Spanish at home. However, students speaking both Spanish and English at home performed more than one standard deviation higher on a measure of English receptive vocabulary than the students speaking only Spanish at home. This suggests that bilingual students' home language preference has little impact on Spanish receptive vocabulary, but home language use of English and Spanish is positively associated with English receptive vocabulary. Because students were only classified as Spanish-only or Spanish- and English-speaking in the context of the home setting, the researchers only examined a small

portion of language use for bilingual students. As a result, the relationship between language preference outside of the home with both receptive and expressive vocabulary still remains unclear.

### *Vocabulary and Reading*

Not only does prior research suggest that language preference influences expressive and receptive vocabulary, as well as reading ability, there is also significant evidence that expressive and receptive vocabulary directly influence reading ability (e.g., Rinaldi, & Paez, 2008). As a result, examining the relationship between language preference, vocabulary and reading is essential for understanding the relationship between language preference and literacy development. However, no prior research has specifically examined the relationship between these variables. Thus, in addition to evaluating the relationship between language preference, receptive and expressive vocabulary, and broad reading, this study also examines the possible role of receptive and expressive vocabulary as mediators in the relationship between outside language preference and broad reading ability.

Although expressive and receptive vocabulary impact reading in bilingual students, both may have differential effects on reading skills. For example, expressive vocabulary measures in both English and Spanish in preschool positively predicted first grade English word reading ability for bilingual students (Rinaldi, & Paez, 2008). Additionally, Carlisle and Beeman (2000) examined the impact of Spanish and English receptive vocabulary in first grade, and language of literacy instruction, either Spanish or English in second grade, on the reading comprehension of the bilingual students at the end of second grade. English receptive vocabulary accounted for approximately 51% of the variance in English reading comprehension, whereas English literacy instruction did not explain any additional variance. On the other hand, Spanish receptive vocabulary only accounted for 22% of the variance in Spanish reading comprehension, whereas Spanish literacy instruction accounted for an additional 43% of variance. This suggests that the relationship between receptive vocabulary and reading comprehension is stronger in English than in Spanish. Similarly, Ziegler and Goswami (2005) propose that the relationship between vocabulary and reading development is stronger in languages with inconsistent orthography, such as English, than in languages with consistent orthography, such as Spanish. In languages with inconsistent

orthography children cannot rely solely on grapheme-phoneme relationships and must use additional strategies, such as accessing vocabulary knowledge, for decoding.

However, using a composite vocabulary score based on measures of both expressive and receptive vocabulary, Swanson et al. (2008) found that the composite Spanish vocabulary score positively predicted Spanish word identification and word attack skills, but did not predict Spanish reading comprehension in third grade bilingual students. Yet, in contrast to prior research using expressive and receptive vocabulary separately, the composite English vocabulary score did not predict English word identification skills, word attack skills or reading comprehension.

Additional research with monolingual English-speaking populations has further established evidence for differential effects of expressive and receptive vocabulary on reading (Chiappe, Chiappe, & Gottardo, 2004; Wise, Sevcik, Morris, Lovett, & Wolf, 2007). Specifically, when examining the relationship between reading-related skills in elementary students with reading disabilities, receptive vocabulary was more strongly related to pre-reading skills, operationalized by measures of phonological processing, than expressive vocabulary (Wise et al., 2007). Yet, only expressive, and not receptive vocabulary predicted letter word identification skills. In another study, Chiappe et al. (2004) found that expressive vocabulary was more closely related to reading skills than receptive vocabulary for high and low elementary school readers. Furthermore, expressive vocabulary revealed higher partial correlations than receptive vocabulary across various reading-related measures including decoding, word attack, phonological awareness and rapid word retrieval. Because research suggests a stronger relationship between expressive vocabulary compared to receptive vocabulary with regard to various reading-related skills, it is predicted that expressive vocabulary will be a stronger predictor of broad reading skills than receptive vocabulary.

## **1.2 Specific Aims**

Aim One of this study investigates the role of English receptive and expressive vocabulary as mediators in the relationship between student language preference outside of the home and English broad



reading ability, after accounting for the effect of home language preference in a group of 2<sup>nd</sup> to 4<sup>th</sup> grade English- and Spanish-speaking Latino students.

Aim Two examines the role of Spanish receptive and expressive vocabulary as mediators in the relationship between student language preference outside of the home and Spanish broad reading ability, after accounting for the effect of language preference at home. As part of the mediations in Aims One and Two, the study also focuses on two sub-aims: (1) the impact of student language preference outside of the home, after accounting for the effect of language preference at home, on receptive and expressive vocabulary in English and Spanish; and (2) the impact of student language preference outside of the home, after accounting for the effect of home language preference, on broad reading abilities in English and Spanish. The purpose of the sub-aims is to identify predictors of vocabulary and reading in both Spanish and English in bilingual elementary students. Identifying the relationships between bilingual students' language preference with vocabulary and reading skills could enhance identification of students needing reading interventions.

Aim Three of this study investigates the role of Spanish receptive and expressive vocabulary as mediators in the relationship between student language preference outside of the home and English broad reading ability, after accounting for the effect of home language preference.

Aim Four examines the role of English receptive and expressive vocabulary as mediators in the relationship between student language preference outside of the home and Spanish broad reading ability, after accounting for the effect of language preference at home.

### **1.3 Hypotheses**

With respect to Aim One, we hypothesize that English expressive vocabulary, and not receptive vocabulary, mediates the relationship between outside language preference and English broad reading ability. Because research suggests a stronger relationship between expressive vocabulary compared to receptive vocabulary with regard to various reading-related skills in English, it is predicted that expressive vocabulary will be a stronger predictor of broad reading skills than receptive vocabulary.

With respect to Aim Two, we hypothesize that neither Spanish expressive or receptive vocabulary mediates the relationship between outside language preference and Spanish broad reading ability. Because students receive literacy instruction in English, it is unlikely that the same relationship between outside language preference, vocabulary and reading ability will be present in Spanish. In regard to our first sub-aim, we hypothesize that student preference for English at home and outside of the home positively predicts both receptive and expressive vocabulary in English. We similarly hypothesize that student preference for Spanish at home and outside home positively predicts both receptive and expressive vocabulary in Spanish. With respect to our second sub-aim, we hypothesize that language preference for English outside of the home positively predicts broad reading in English. Again, students are instructed with English-only literacy classes, so we hypothesize that preference for Spanish outside home does not predict broad reading ability in Spanish.

With respect to Aim Three, we hypothesize that Spanish expressive vocabulary, and not receptive vocabulary, mediates the relationship between outside language preference and English broad reading ability when accounting for home language preference. According to the psycholinguistic grain size theory, Spanish expressive vocabulary would likely predict English broad reading because of the shared cognates between the languages and the need for additional re-coding strategies when reading in English, an orthographically and phonologically inconsistent language.

With respect to Aim Four, we similarly hypothesize that English expressive vocabulary will mediate the relationship between outside language preference and Spanish broad reading ability above and beyond the effects of home language preference. According to the psycholinguistic grain size theory, fewer re-coding strategies are needed when students are reading in the orthographically and phonographically consistent language of Spanish. However, previous research generally supports the transfer of vocabulary and reading-related skills between Spanish and English for bilingual students. Thus, we believe that English expressive vocabulary will mediate the relationship between outside language preference and Spanish broad reading.

## 2 METHOD

### 2.1 Participants

Participants were 58 bilingual Latino elementary students (Spanish- and English-speaking) in 2<sup>nd</sup> – 4<sup>th</sup> grade. Children were selected from five public elementary schools in the Metro Atlanta area as part of a larger study of reading development and linguistics. At all schools, English was the primary language of instruction. Of the participants, 37 were Spanish-reading dominant, defined as learning to read primarily in Spanish first, and 21 were English-reading dominant, defined as learning to read primarily in English first. Participants ranged in age from 7 years, 5 months, to 11 years, 1 month ( $M = 8.98$ ,  $SD = .98$ ). Thirty-four of the participants were female, and 24 were male. Forty-three percent of the participants were in second grade, 29 percent in third grade and 28 percent in fourth grade. Forty-eight percent of participants were born in the United States. Of the participants born outside of the United States, 26 were born in Mexico and 1 in Columbia. Participants ranged in age from 2-years old to 9-years old at the time of immigration to the United States ( $M = 5.85$ ,  $SD = 1.59$ ). As a whole, participants ranged in socio-economic status from low to low-average.

For the reading and vocabulary measures, age-normed standard scores were used for all analyses. Means and standard deviations of all variables are summarized in Table 1.1. In general, the participants' scores were in the low-average range on English and Spanish measures of expressive and receptive vocabulary, and broad reading. Similar to prior research with bilingual students, the participants reported a preference for speaking English outside of the house and a preference for speaking Spanish at home (Brenneman et al., 2007).

### 2.2 Procedure

Students were selected for this study who met the following criteria: (1) student was bilingual in English and Spanish; (2) student was in second, third, or fourth grade; (3) student scored in the bottom quartile on statewide standardized English reading assessments; and (4) student had an absence of mental retardation, brain injury, or severe mental health problems (e.g., clinical depression, bipolar disorder,

etc.). The selection of only students from the bottom quartile limits the variability as well as the generalizability of the sample. Participants who had repeated a grade were also included in this study as they represented some of the more linguistically weak subjects available. Children meeting the outlined criteria received parental consents via the classroom teacher. Only students who returned consents signed by a parent or guardian to the classroom teacher participated in the study.

Additional information was obtained about each child's demographic, language preferences, educational history, family background, and developmental background using a parent questionnaire. Follow-up phone calls were made by a bilingual research assistant to clarify missing or unclear information from the questionnaire when possible. No incentives for parents or students were provided for participation. After receiving assent for participation from each participant, examiners administered selected vocabulary and reading measures at each student's school. Only bilingual examiners administered the Spanish measures. Research assistants at Georgia State University double-entered all data into SPSS files. The data were then cross checked for accuracy and the project coordinator resolved any scoring issues.

### **2.3 Measures**

#### *Outside and Home Language Preference*

An adapted parent questionnaire (Ledesma & Morris, 2005) was used to determine each student's language preferences at home and outside of the home. The language preference checklist asked parents to rate their children's use of Spanish and English in different social contexts and with various individuals. For example, the questionnaire asked, "In which language does your child speak to the following people?" and listed parents, siblings, grandparents, other relatives, friends, coaches, and religious figures. Parents also reported students' language preference for watching television, watching videos, listening to Cassettes/CDs, listening to the radio, and reading books. The Language Preference Questionnaire was scored using a 5-point Likert scale in which 1 = always in *English*, 2 = *English more than Spanish*, 3 = equally in *both English and Spanish*, 4 = *Spanish more than English*, and 5 = always in

*Spanish.* Similar to previous research with this measure, average scores were created for home language preference and outside of the home language preference using previous factor results to develop composite scores (Brenneman et al., 2007).

### *English Reading*

To assess English reading ability, participants completed the Woodcock-Johnson Tests of Achievement-Third Edition (WJ-III; Woodcock, McGrew, & Mather, 2001). Letter-Word Identification, Passage Comprehension and Reading Fluency were administered from the WJ-III. In Letter-Word Identification, participants matched a rebus, or pictoric representation of a word, with an actual picture of an object for the first five items. For the remaining objects, students used their reading skills to identify letters and words. For the Passage Comprehension subtest, participants first point to a picture that represents a short phrase. For the remaining items, participants read a short passage and identified a missing word. Lastly, in Reading Fluency, participants answer yes or no questions to short sentences they read. Letter-Word Identification, Passage Comprehension and Reading Fluency were used to develop each student's Broad Reading cluster score, a comprehensive measure of reading achievement. Cluster interpretation minimizes the danger of generalizing from the score for a single, narrow ability to a broad, multifaceted ability. This results in higher validity because more than one component of a broad ability comprises the score that serves as the basis for interpretation.

Normative data for the WJ-III were gathered from 8,818 people in over 100 communities in the United States. Although the sample was selected to be representative of the U.S. population from 2 to 90 years and older, this norm group likely shares a different cultural and linguistic background than the most of the participants and therefore may have limited validity for this sample. Split-half reliabilities were calculated for all tests but the Reading Fluency, which used Rasch analysis procedures. For children between the ages of 7 and 11, these reliabilities range from the .83 to .97. However, the publishers recommend using cluster scores because the cluster scores consistently have higher reliability. The reliability of the Broad Reading cluster is from .92 to .95. The test-retest reliabilities for this population

range from .91 to .95. In terms of concurrent validity, correlations range from .30 to .71 between scores on the WJ-III Broad Reading and the Wechsler Intelligence Scale for Children-Third Edition.

#### *English Expressive Vocabulary*

As a measure of English expressive vocabulary, students completed the Picture Vocabulary subtest of the WJ-III. Students are asked to name pictured objects. Although there are a few receptive items at the start of the test, the remaining items assess expressive vocabulary (naming) at the single-word level. Items become progressively more difficult as they contain less and less common objects. The reliability of the Picture Vocabulary measure for 7- to 11-year old children ranges from .71 to .80.

#### *English Receptive Vocabulary*

As a measure of English receptive vocabulary, students completed the Peabody Picture Vocabulary Test- Third Edition (PPVT-III; Dunn & Dunn, 1997). This individually administered test is untimed and requires no reading or writing from the participant. The examiner orally presents a stimulus word and the test taker is asked to select one of four pictures that best represents the word's meaning. The norming sample for the PPVT-III consisted of a stratified random sample of 2,725 persons ages 2.5 to over 90 selected to proportionately match the population distribution in the March 1994 Current Population Survey on gender, race/ethnicity, geographic region, and socioeconomic states. "Hispanics" comprised 12.9 percent of the standardization sample compared to 12.4 percent of the US population. A multicultural panel reviewed items, but the sample was restricted to individuals who were determined to speak and understand English. Thus, the standard scores obtained by this measure were obtained by using a norm group from a possibly different cultural and linguistic background than the majority of the participants and therefore may have limited validity for this sample. The reliability of the PPVT-III is generally strong for children ages 7 to 11: the mean internal consistency alpha is .95, the mean split-half reliability is .94, and the test-retest reliability is .93. In terms of concurrent validity, correlations between the PPVT-III and the Wechsler Intelligence Scale for Children-Third Edition (WISC III; Wechsler, 1991) are high: .91 Verbal IQ, .82 Performance IQ, and .90 Full Scale IQ. Correlations between the PPVT-III

and other vocabulary tests and subtests range from .40 to .76. No information is provided on predictive validity.

#### *Spanish Reading*

To measure Spanish reading, students completed the Woodcock Language Proficiency Battery-Revised (WLPB-R; Woodcock & Muñoz-Sandoval, 1995). To measure Broad Reading, three subtests of the WLPB-R were administered: *Identificación de Letras y Palabras*, *Comprensión de Textos*, and *Fluidez en la Lectura*. The administration and scoring procedures of these subtests were comparable to the WJ-III. The Spanish WLPB-R standardization sample consisted of approximately 2,000 Spanish-speaking people from Costa-Rica, Mexico, Puerto Rico, and Spain as well as 1,325 bilingual people from the United States. The reliability coefficients for the WLPB-R Spanish subtests are in the .80 and .90s. The WLPB-R Spanish cluster reliability coefficients are in the .90s. However, the WLPB-R provided little validity data for the use of this measure with Spanish-speaking children.

#### *Spanish Expressive Vocabulary*

As a measure of Spanish expressive vocabulary, students completed the Picture Vocabulary subtest of the WLPB-R (Woodcock & Muñoz-Sandoval, 1995). It mirrored the WJ-III English Picture Vocabulary measure in administration and scoring.

#### *Spanish Receptive Vocabulary*

As a measure of Spanish receptive vocabulary, participants completed the Test de Vocabulario en Imágenes Peabody (TVIP; Dunn et al. 1986). The TVIP is based on the PPVT and includes 125 translated items to assess the receptive Spanish vocabulary of Spanish-speaking and bilingual children. Items were selected through item analysis for their universality and appropriateness to Spanish-speaking communities. The TVIP is administered and scored similarly to the PPVT-III, although raw scores on the TVIP are converted into age-adjusted standardized scores using Mexican norms, Puerto Rican norms, or norms for a composite group (Dunn et al. 1986). Because the composite norms include the whole sample, Dunn and colleagues (1986) recommend use of these norms over the Mexican and Puerto Rican norms.

The standardization sample consisted of monolingual, Spanish-speaking students in Latin America. Testing in Mexico included 1,219 children and testing in Puerto Rico included 1,488 children. Considering that 26 of the 27 students born outside of the United States are from Mexico, the norms seem appropriate to this sample. To correct for unevenness of socioeconomic status representation between the norming sample in Mexico and Puerto Rico, a weighting system was used to increase or decrease the contributions of each individual's score at each age, so as to fit the socioeconomic ratios established by the U.S. census statistics. The internal consistency for the TVIP using the median correlation coefficient, corrected using the Spearman-Brown formula, is .93 (Dunn et al., 1986). The TVIP includes no test-retest reliability or inter-rater reliability. In terms of concurrent validity, correlations range from .40 to .72 between scores on the TVIP and the Kaufmann-Assessment Battery for Children (ABC)- Spanish Global Scales and from .50 to .65 between the TVIP and the Kaufman-ABC Achievement Scale Subtests among children ages 6 to 12. No information is reported on predictive validity.

## 2.4 Analyses

Multivariate hierarchical regression analyses were used to address the specific questions of the study. For each of the analyses, the outcome variable was a broad reading composite measure (either Spanish or English). The predictor variable of outside language preference and the covariate of home language preference were added in step 1. The mediators of expressive and receptive vocabulary were added in step 2. The language (i.e., English and Spanish) of the receptive vocabulary measure (e.g., PPVT and TVIP), the expressive vocabulary measure (e.g., Picture Vocabulary; WJ-III and WLPB-R), and the reading measure (e.g., Broad Reading; WJ-III and WLPB-R) varied by question: (1) English vocabulary/English reading; (2) Spanish vocabulary/Spanish reading; (3) Spanish vocabulary/English reading; and (4) English vocabulary/Spanish reading.

To assess the role of expressive and receptive vocabulary as mediators of the relationship between outside language preference and broad reading, we evaluated different effects and their corresponding weights. In our analyses, the *total effect* (weight *c*) of outside language preference, the



independent variable (IV), on broad reading, the dependent variable (DV), was composed of a *direct effect* (weight  $c'$ ) of the IV on the DV, as well as an *indirect effect* (weight  $a \times b$ ) of the IV on the DV through expressive and receptive vocabulary, the proposed mediators ( $M$ ). Here, weight  $a$  represented the effects of the IV on the  $M$ , whereas weight  $b$  was the effect of the  $M$  on the DV after accounting for the effect of the IV. Thus, an indirect effect was the multiplication of the unstandardized regression weight of the IV on the  $M$  and the weight of the  $M$  on the DV. Using multiple mediators in our analyses, we estimated total indirect effects as well as specific indirect effects for each mediator.

In this study, we employed a bootstrapping method with 5000 bootstrap resamples to assess indirect effects (see Preacher & Hayes, 2008). Bootstrapping, a nonparametric resampling procedure, uses the available data to calculate an empirical approximation of the sampling distribution. These bootstrapping sampling distributions use a sample with replacement of size  $n$  from the complete data set to calculate indirect effects of the resample. Bootstrapping provides point estimates and 95% confidence interval estimates for the indirect effects. To test our hypotheses, we considered point estimates of indirect effects significant when zero was not contained in the bias-corrected and accelerated confidence intervals. In addition, we examined specific indices of the vocabulary indirect effects, which allowed for a direct comparison between measures.

### 3 RESULTS

#### 3.1 Language Preference

In order to replicate previous research with this measurement tool we conducted a principal components analysis of the 13-items from the language preference questionnaire (Brenneman et al., 2007; Ledesma & Morris, 2005) and used Catell's scree test to identify two primary factors: home language preference and outside language preference. Varimax rotation was used to identify distinctive groups of interrelated items. The loadings of each checklist item are listed by factor in Table 2.1. Similar to Brenneman et al. (2007), we used a weighting criterion of .50 for inclusion of an item as part of a factor. Languages spoken with siblings, other relatives, coaches, and religious figures had weighting criteria of less than .50 on any factor and were thus excluded.

Composite variables for outside and home language preference were created using participant's mean score on the items representing that factor. Home language preference scores, for example, were comprised of the average ratings of the language used by a child with their mother, father and grandparents. The outside language preference score was comprised of the average ratings of the language used by a child with their friends, and the ratings of language used by a child for television, videos, radio, CDs and books, comics and magazines. The composite variables of outside and home language preference were used in subsequent analyses.

#### 3.2 Zero-Order Correlations

A zero-order correlation matrix including all variables is presented in Table 3.1. As expected, the zero-order correlation matrix revealed that increased outside language preference for Spanish was associated with lower English broad reading. In contrast to outside language preference, home language preference for Spanish was not associated with reading or vocabulary measures in either language. There were also significant relationships between the reading and vocabulary measures. More specifically, English broad reading was positively associated with English expressive and receptive vocabulary as well as Spanish broad reading. In addition, English expressive vocabulary was positively associated with

English receptive vocabulary and negatively associated with Spanish expressive vocabulary and Spanish broad reading. Similar to English expressive vocabulary, we found that English receptive vocabulary was negatively associated with Spanish broad reading. Furthermore, Spanish broad reading was positively associated with both Spanish expressive and receptive vocabulary. Predictably, Spanish expressive vocabulary was also positively associated with Spanish receptive vocabulary.

### **3.3 Multiple Regression/Mediation Analyses**

#### *Regression Diagnostics*

Regression diagnostics for Hypothesis One revealed a significant outlier. Specifically, a scatterplot and partial plots indicated that one case was more than four standard deviations from the mean. Casewise diagnostics for this case indicated a standardized residual of -3.84. Because this case was more than three standard deviations from the mean, the cutoff that we established for outliers, it was removed from further analyses. Review of the English reading histogram suggested a slight negative skew. Visual examination of the standardized residuals suggested normal distribution and homoscedasticity. The Durbin-Watson statistic was 2.14, which suggested that adjacent residuals were not correlated and the average VIF was 1.19, which also indicated that collinearity was not a problem for this model.

For the remaining regression analyses, regression diagnostics revealed no significant violations of assumptions. Scatterplots for Hypotheses Two, Three and Four revealed no significant outliers. Furthermore, the plots of the standardized residuals suggested that normal distribution of the residuals and homoscedasticity. Across these analyses, the Durbin-Watson statistics ranged from 1.49 to 2.10, which suggested that adjacent residuals were not correlated, and the average VIF ranged from 1.18 to 1.19, which also suggested that collinearity was not a problem for these models. Because the regression assumptions were met, we assumed the generalizability of these models (Cohen, Cohen, West, & Aiken, 2003).

### *Hypothesis One*

For Hypothesis One, we assessed the role of English receptive and expressive vocabulary as mediators in the relationship between outside language preference and English broad reading ability using multivariate hierarchical regression (Table 4.1). The first step of the regression analysis indicated that a medium proportion of variance in English reading ability was associated with outside language preference after accounting for home language preference,  $R^2 = .27$ ,  $F(2, 57) = 10.16$ ,  $p \leq .001$ . Outside and home language preference accounted for 27% of the variation in English broad reading. There was a statistically significant negative effect of outside language preference for Spanish on English broad reading ability while accounting for home language preference,  $\beta = -.53$ ,  $p \leq .001$ . The covariate of home language preference did not significantly predict English broad reading ability.

In the second step of the hierarchical regression, the mediators, English expressive and receptive vocabulary, accounted for significantly more variance in English broad reading,  $R^2$  change = .13,  $F(4, 57) = 5.70$ ,  $p = .006$ . The coefficient for English expressive vocabulary was significant,  $\beta = .36$ ,  $p = .007$ ; however, the coefficient for English receptive vocabulary was not significant,  $\beta = .02$ ,  $p = .88$ . When the mediators, English expressive and receptive vocabulary, were entered in step 2, the coefficient for outside language preference decreased to  $\beta = -.44$ ,  $p \leq .001$ .

As recommended for small samples, we used nonparametric bootstrapping analyses (see Preacher & Hayes, 2008) to test the mediational model of English expressive and receptive vocabulary as mediators of the relationship between outside language preference and English broad reading (Table 4.2). Mediation is significant if the 95% bias corrected and accelerated confidence interval does not include zero. Results based on 5000 bootstrapped samples indicated that the combined indirect effects of English expressive and receptive vocabulary had a non-significant effect on the relationship between outside language preference and English broad reading,  $b = -.16$ ,  $CI_{95} = -3.96, .15$ . However, English expressive vocabulary was a significant mediator of the relationship between outside language preference and English broad reading,  $b = -.07$ ,  $CI_{95} = -3.98, -.03$ . In contrast, English receptive vocabulary was a not

significant mediator,  $b = -.09$ ,  $CI_{.95} = [-1.84, .71]$ . Thus, English expressive vocabulary partially mediated the relationship between outside language preference and English broad reading ability.

### *Hypothesis Two*

For Hypothesis Two, we assessed the role of Spanish receptive and expressive vocabulary as mediators in the relationship between outside language preference and Spanish broad reading ability using multivariate hierarchical regression (Table 4.3). The first step of this hierarchical regression analysis indicated that variance in Spanish broad reading, after accounting for home language preference, was not associated with outside language preference,  $R^2 = .007$ ,  $F(2, 57) = .20$ ,  $p = .82$ . Neither outside language preference for Spanish  $\beta = -.06$ ,  $p = .67$  nor home language preference, a covariate, significantly predicted Spanish broad reading ability,  $\beta = .07$ ,  $p = .60$ .

However, in the second step of the hierarchical regression, the mediators, Spanish expressive and receptive vocabulary, added significant variance accounted for in Spanish broad reading,  $R^2$  change = .30,  $F(4, 57) = 11.32$ ,  $p \leq .001$ . The coefficient for the mediator of Spanish receptive vocabulary was significant,  $\beta = .38$ ,  $p = .007$ ; however, the coefficient for the mediator of Spanish expressive vocabulary was not significant,  $\beta = .25$ ,  $p = .08$ . Because of the non-significant relationship between outside language preference and broad reading ability, nonparametric bootstrapping analyses to test this mediation model was not pursued.

### *Hypothesis Three*

For Hypothesis Three, we addressed the role of Spanish receptive and expressive vocabulary as mediators in the relationship between outside language preference and English broad reading ability using a multivariate hierarchical regression (Table 4.4). Step one of the hierarchical regression explained a medium proportion of variance in English reading ability was associated with outside language preference after accounting for home language preference,  $R^2 = .27$ ,  $F(2, 57) = 10.16$ ,  $p \leq .001$ . There was a statistically significant negative effect of outside language preference for Spanish on English broad

reading ability after accounting for home language preference,  $\beta = -.53, p \leq .001$ ; however, home language preference, a covariate, did not significantly predict English broad reading,  $\beta = .03, p = .78$ .

In the second step of the hierarchical regression, the mediators of Spanish expressive and receptive vocabulary did not account for significantly more variance in English broad reading,  $R^2$  change = .01,  $F(4, 57) = .30, p = .74$ . The coefficient for Spanish expressive vocabulary,  $\beta = -.11, p = .45$  as well as the coefficient for Spanish receptive vocabulary were not significant,  $\beta = .07, p = .59$ . Because of the non-significant relationship between Spanish expressive and receptive vocabulary, and English broad reading, nonparametric bootstrapping analyses to test this mediation model was not conducted.

#### *Hypothesis Four*

In Hypothesis Four, we examined whether English receptive and expressive vocabulary mediate the relationship between outside language preference and Spanish broad reading using multivariate hierarchical regression (Table 4.5). The first step of the regression indicated that outside language preference and home language preference did not predict Spanish broad reading ability,  $R^2 = .01, F(2, 57) = .20, p = .82$ .

In the second step of the hierarchical regression, the mediators of English expressive and receptive vocabulary did not account for significantly more variance in Spanish broad reading,  $R^2$  change = .11,  $F(4, 57) = 3.14, p = .05$ . Consequently, neither the coefficient for English expressive vocabulary,  $\beta = -.18, p = .26$ , nor English receptive vocabulary,  $\beta = -.20, p = .20$ , significantly predicted Spanish broad reading. Similar to the previous analyses, we did not conduct nonparametric bootstrapping analyses because of the non-significant relationship between outside language preference and Spanish broad reading, as well as the non-significant relationship between English expressive and receptive vocabulary and Spanish broad reading.

## 4 DISCUSSION

The primary goal of this study was to examine the relationship between outside language preference, expressive and receptive vocabulary, and broad reading ability in Spanish- and English-speaking 2<sup>nd</sup> through 4<sup>th</sup> grade students. Based on the psycholinguistic grain size theory and previous research, we hypothesized that English expressive, but not receptive, vocabulary would mediate the relationship between outside language preference and English broad reading. The psycholinguistic grain size theory proposes that the relationship between vocabulary and reading development is stronger in languages with inconsistent orthography, such as English, than in languages with consistent orthography, such as Spanish (Ziegler & Goswami, 2005). In languages with inconsistent orthography children cannot rely solely on grapheme-phoneme relationships and must use additional strategies, such as accessing vocabulary knowledge, for decoding. As predicted, only English expressive vocabulary mediated the relationship between outside language preference and English broad reading ability. Also consistent with our hypotheses, we found that neither Spanish expressive nor receptive vocabulary mediated the relationship between outside language preference and Spanish broad reading ability.

Not only did we observe a closer relationship between language preference, vocabulary and reading in English compared to Spanish, but also we found that it was only English expressive vocabulary that mediated the relationship between outside language preference and English broad reading. This was similar to previous research by Rinaldi and Paez (2008), which found that preschool expressive vocabulary in English positively predicted first grade English word reading ability for bilingual students. Additionally, research with monolingual English-speaking populations has established differential effects of expressive and receptive vocabulary on reading (Chiappe et al., 2004; Wise et al., 2007). In elementary students with reading disabilities, receptive vocabulary was more strongly related to pre-reading skills, such as phonological processing, than expressive vocabulary; however, only expressive vocabulary predicted letter word identification skills (Wise et al., 2007). In another study, expressive vocabulary was more closely related to reading skills, including decoding, word attack, phonological

awareness and rapid word retrieval, than receptive vocabulary in elementary school readers (Chiappe et al., 2004). Given that receptive vocabulary may be more closely related to phonological processing and that expressive vocabulary may be more closely related to decoding and rapid word retrieval, it is not surprising that expressive vocabulary was more closely related to broad reading.

The broad reading cluster score from the WJ-III and WRMT-R used in our study assessed the reading skills of word reading, reading comprehension and reading speed. This did not, however, include direct assessments of phonological processing, which some evidence suggests is more closely related to receptive vocabulary in English speaking students. Thus, our results were consistent with the idea that expressive vocabulary, compared to receptive vocabulary, has a stronger relationship with various reading-related skills in English, and therefore is a better predictor of broad reading.

As found in our study and in previous research, outside language preference did not influence Spanish reading outcomes, such as broad reading, in bilingual students receiving reading instruction in English (Brenneman et al., 2007). We did find, however, that after accounting for outside and home language preference, Spanish receptive vocabulary was a significant predictor of Spanish broad reading. In addition, although not statistically significant, Spanish expressive vocabulary was a marginally significant ( $p = .086$ ) predictor of Spanish broad reading. The fact that Spanish receptive vocabulary was a significant predictor of Spanish broad reading, and that Spanish expressive vocabulary was a marginally significant predictor of Spanish broad reading, suggested that expressive and receptive vocabulary contribute separated and unique variance to reading ability. Furthermore, it is also important to note that English expressive vocabulary was a significant predictor of English broad reading whereas Spanish receptive vocabulary was the only statistically significant predictor of Spanish broad reading. Much of the research on the differential effects of receptive and expressive vocabulary on reading skills has been done with monolingual English-speaking students. Thus, for the bilingual students in our study who were receiving literacy instruction in English, Spanish receptive vocabulary had a stronger impact on Spanish broad reading.



In regards to our cross-language hypotheses, we predicted that expressive vocabulary in one language would mediate the relationship between outside language preference and broad reading in the other language. In contrast to our hypotheses, we found no evidence that Spanish expressive or receptive vocabulary mediated the relationship between outside language preference and English broad reading. Additionally, we found no evidence that English expressive or receptive vocabulary mediated the relationship between outside language preference and Spanish broad reading. Similarly, using a composite vocabulary score, which combined measures of expressive and receptive vocabulary, Swanson et al. (2008) found no relationship between Spanish vocabulary and English reading skills, above and beyond English vocabulary and syntax. They also found no relationship between English vocabulary and Spanish reading skills, above and beyond Spanish vocabulary and syntax. However, other research reported a significant effect of Spanish vocabulary on English reading comprehension (Proctor et al., 2006) as well as an association between Spanish expressive vocabulary and English word reading (Rinaldi & Paez, 2008).

Interestingly, although we found a negative relationship between expressive vocabulary in Spanish and expressive vocabulary in English ( $r = -.29$ ), broad reading skills in both languages were positively associated ( $r = .31$ ). This suggested that to us, that other reading related skills, such as phonological awareness, that were not included in our model might also be impacting the transfer of reading skills across languages. Previous research with Spanish- and English-speaking students identified a weak relationship between oral language skills in both languages, but yet identified a strong relationship between phonological awareness skills in both languages (Cardenas-Hagan et al., 2007). These authors suggested that this was indicative of the direct transfer of phonological awareness skills. Because our study did not include other reading related variables, such as phonological awareness, it is important to note that the relationship between language preference, expressive and receptive vocabulary, and broad reading ability is likely more complicated than our model suggests.

### *Limitations*

There were various sample-related and measurement-related limitations in this study. This sample included only bilingual students who performed in the bottom quartile on a statewide standardized English reading assessment. In addition, the educational background and experiences of the students in our study varied significantly. For example, while some students had been educated in English for many years, others had received most of their education in Spanish and were just beginning their schooling in English. These sample-related limitations likely influenced the significant variation that was observed in student performance on the Spanish WLPB-R. For example, standard score performance of the Spanish broad reading ranged from 44 to 144 ( $M = 86.55$ ,  $SD = 26.75$ ) just as Spanish expressive vocabulary ranged from 10 to 127 ( $M = 76.22$ ,  $SD = 24.73$ ). It is not surprising that the mean student performance is in the low average range for Spanish broad reading and Spanish expressive vocabulary because students are receiving reading instruction in English only. However, the significant variability observed in student performance is surprising and suggests that there are other possibly important differences in the student population used for this study.

We also had noteworthy measurement-related limitations in this study. More specifically, our language preference data came from parents' reports of their child's behavior, which can be influenced by a variety of factors. For example, we asked parents to report language use for their children, but did not corroborate this with independent measurements of child language use in different contexts. Although previous work has demonstrated correlations between observational data and parent reports (for more information see Patterson, 2006), this study did not use systematic naturalistic observation. Future studies may wish to not only include naturalistic observation, but also additional reporters, such as teachers and the students themselves.

### *Implications and Future Research*

Spanish- and English-speaking bilingual students are the largest segment of bilingual students in US schools, and thus identifying the factors that influence their reading development is very important. This is especially true because many Latino bilingual students read below expectations. Because we

found that English expressive vocabulary partially mediated the relationship between outside language preference and English broad reading, it can be suggested that in English expressive vocabulary may be the mechanism by which outside language preference is impacting reading. Furthermore, we found that Spanish receptive vocabulary predicted Spanish broad reading. Taken together, these results suggest that vocabulary, both expressive and receptive depending on the language, significantly impacts the broad reading ability of bilingual students. This also supports the notion that targeted vocabulary intervention may be an important means of improving reading outcomes in English- and Spanish-speaking bilingual students as suggested by previous research (see review by August, Carlo, Dressler, & Snow, 2005).

Future research in this area would benefit from a more general sample of Spanish- and English-speaking bilingual students to validate the results of this study. In addition, it may be interesting to replicate the mediation model tested in this study in other languages, which share the orthographic and phonological consistency of English and Spanish. Lastly, research suggests that in Spanish- and English-speaking toddlers, the frequency of being read to in each language was positively associated with expressive vocabulary in that language (Patterson, 2002). Thus, including reading-related variables, such as time spent reading with parents or number of books in the home, in the study would provide additional information about the relationship between outside language preference, receptive and expressive vocabulary, and broad reading ability.

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## 6 TABLES

**Table 1.1***Mean, Standard Deviation, and Range of Language Preference, Vocabulary, and Reading Measures*

	<i>M</i>	<i>SD</i>	<i>Range</i>
1. Outside Language Preference <sup>a</sup>	1.73	.86	1-5
2. Home Language Preference <sup>a</sup>	4.25	.91	1-5
3. English Broad Reading <sup>b</sup>	88.81	11.15	58-109
4. English Expressive Vocabulary <sup>b</sup>	82.29	9.31	55-101
5. English Receptive Vocabulary <sup>c</sup>	82.14	14.34	53-109
6. Spanish Broad Reading <sup>d</sup>	86.56	26.52	44-144
7. Spanish Expressive Vocabulary <sup>d</sup>	76.19	24.52	10-127
8. Spanish Receptive Vocabulary <sup>e</sup>	88.37	16.55	55-125

<sup>a</sup> Higher language preference is indicative of increased Spanish-language preference.

<sup>b</sup> WJ-III ( $\bar{X} = 100, SD = 15$ )

<sup>c</sup> PPVT ( $\bar{X} = 100, SD = 15$ )

<sup>d</sup> WLPB-R ( $\bar{X} = 100, SD = 15$ )

<sup>e</sup> TVIP ( $\bar{X} = 100, SD = 15$ )

**Table 2.1***Factor Loadings of Items on Language Preference Factor Scores*

Items	Outside Factor	Home Factor
Watching videos	<b>.79</b>	.15
Listening to radio	<b>.78</b>	.20
Listening to CDs	<b>.78</b>	.25
Watching television	<b>.74</b>	-.26
Speaking to friends	<b>.74</b>	.11
Reading books	<b>.63</b>	.02
Speaking to mother	.19	<b>.94</b>
Speaking to father	.11	<b>.92</b>
Speaking to grandparents	-.01	<b>.83</b>
Speaking to siblings*	-.12	.44
Speaking to other relatives*	.10	.27
Speaking to religious figures*	.02	.48
Speaking to coaches*	-.33	.42
Eigenvalues after rotation		
	4.22	2.58
Variance explained per factor after rotation		
	32%	20%

\*Not used in factor composite scores due to low loadings.



**Table 3.1***Intercorrelations Between Language Preference, Vocabulary, and Reading Measures*

	1	2	3	4	5	6	7
1. Outside Language Preference <sup>a</sup>	—						
2. Home Language Preference <sup>a</sup>	.20	—					
3. English Broad Reading <sup>b</sup>	-.52**	-.07	—				
4. English Expressive Vocabulary <sup>b</sup>	-.24	-.08	.48**	—			
5. English Receptive Vocabulary <sup>c</sup>	-.21	-.02	.32*	.57**	—		
6. Spanish Broad Reading <sup>d</sup>	-.05	.06	.28*	-.26	-.27*	—	
7. Spanish Expressive Vocabulary <sup>d</sup>	.20	.09	-.17	-.30*	-.21	.43**	—
8. Spanish Receptive Vocabulary <sup>e</sup>	.07	.11	-.01	-.14	-.09	.50**	.52**

Note. \*  $p < .05$ , \*\*  $p < .01$ .

<sup>a</sup> Higher language rating is indicative of increased Spanish-language preference.

<sup>b</sup> WJ-III ( $\bar{X} = 100$ ,  $SD = 15$ )

<sup>c</sup> PPVT ( $\bar{X} = 100$ ,  $SD = 15$ )

<sup>d</sup> WLPB-R ( $\bar{X} = 100$ ,  $SD = 15$ )

<sup>e</sup> TVIP ( $\bar{X} = 100$ ,  $SD = 15$ )

**Table 4.1**

*Summary of Hierarchical Regression Analysis for English Vocabulary as a Mediator of Language Preference and Broad Reading Ability in English*

	<i>B</i>	<i>SE B</i>	$\beta$
Step 1			
Home language preference	.40	1.43	.03
Outside language preference	-6.84**	1.53	-.53**
Step 2			
Home language preference	.57	1.33	.05
Outside language preference	-5.73**	1.46	-.44**
English Expressive vocabulary	.44**	.16	.36**
English Receptive vocabulary	.02	.10	.02

*Note.*  $R^2 = .27$  for step 1:  $\Delta R^2 = .13$  for step 2 ( $ps < .05$ ), \* $p < .05$ , \*\* $p < .01$ .

**Table 4.2**

*Summary of Indirect Effects for English Vocabulary as a Mediator of Language Preference and Broad Reading Ability in English*

	Point Estimate	Bootstrapping	
		BCa 95% CI	
		Lower	Upper
Expressive Vocabulary	-1.06	-3.98	-.03
Receptive Vocabulary	-.05	-1.84	.71
TOTAL	-1.11	-3.96	.15

*Note.* BCa = bias corrected and accelerated; 5,000 bootstrap samples.

**Table 4.3**

*Summary of Hierarchical Regression Analysis for Spanish Vocabulary as a Mediator of Language Preference and Broad Reading Ability in Spanish*

	<i>B</i>	<i>SE B</i>	$\beta$
Step 1			
Home language preference	2.12	3.99	.07
Outside language preference	-1.84	4.26	-.06
Step 2			
Home language preference	.72	3.42	.03
Outside language preference	-4.08	3.70	-.13
Spanish Expressive vocabulary	.27	.15	.25
Spanish Receptive vocabulary	.62**	.22	.38**

*Note.*  $R^2 = .007$  for step 1 ( $p = .82$ );  $\Delta R^2 = .30$  for step 2 ( $p = .001$ ), \* $p < .05$ , \*\* $p < .01$ .

**Table 4.4**

*Summary of Hierarchical Regression Analysis for Spanish Vocabulary as a Mediator of Language Preference and Broad Reading Ability in English*

	<i>B</i>	<i>SE B</i>	$\beta$
Step 1			
Home language preference	.40	1.43	.03
Outside language preference	-6.84**	1.53	-.53**
Step 2			
Home language preference	.37	1.46	.03
Outside language preference	-6.64**	1.58	-.51**
Spanish Expressive vocabulary	-.05	.06	-.11
Spanish Receptive vocabulary	.05	.09	.07

*Note.*  $R^2 = .27$  for step 1 ( $p = .001$ );  $\Delta R^2 = .008$  for step 2 ( $p = .74$ ), \* $p < .05$ , \*\* $p < .01$ .

**Table 4.5**

*Summary of Hierarchical Regression Analysis for English Vocabulary as a Mediator of Language Preference and Broad Reading Ability in Spanish*

	<i>B</i>	<i>SE B</i>	$\beta$
Step 1			
Home language preference	2.12	3.99	.07
Outside language preference	-1.84	4.26	-.06
Step 2			
Home language preference	2.01	3.85	.07
Outside language preference	-4.40	4.23	-.14
English Expressive vocabulary	-.38	.29	-.20
English Receptive vocabulary	-.52	.46	-.18

*Note.*  $R^2 = .007$  for step 1 ( $p = .82$ );  $\Delta R^2 = .11$  for step 2 ( $p = .05$ ), \* $p < .05$ , \*\* $p < .01$ .