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Relationships among language use, phonological skill, and vocabulary in English language learning preschoolers

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Relationships Among Language Use, Phonological Skill, and Vocabulary in English

Language Learning Preschoolers

by

Timothy D. Hill

A thesis submitted in partial fulfillment
of the requirements for the degree of
Master of Science
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(PWP), mother's language ability

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Relationships Among Language Use, Phonological Skill, and Vocabulary in
English Language Learning Preschoolers

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ABSTRACT

The present study present study explored the relationships among language use, phonological skill, and vocabulary development for 36 Cuban and Puerto Rican ELL preschoolers. Family-level variables included mother's education level and mother's language ability. Three-way ANOVAs were used to investigate the relationships among child- and family-level variables and children's performance on articulation (completeness of phonetic inventory (CPI) and proportion of whole-word proximity (PWP)) and language measures (Picture Vocabulary (PV) and Memory for Sentences (MS) subtests of the WLPB-R) in English and Spanish. Regression and correlational analyses were conducted to describe relationships between variables.

Findings indicated that children in all language groups (predominantly English speaking, predominantly Spanish speaking and bilingual) demonstrated strong phonological skills, as measured by CPI and PWP, in both languages. Strength in phonological skill appeared to be related to frequency of language use, especially in English. Similarities in children's phonetic inventories across languages suggested that exposure to two languages does not interfere with phonological development in ELL children. The fact that English and Spanish share many of the same phonemes may contribute to this finding. Results for the PWPs were consistent with the findings from

the CPI analyses. PWPs were found to predict children's English vocabulary level in the early stages of dual language learning.

A predictive relationship was found between mother's English language ability and child's phonological skill, suggesting that when more English was used in the home, children exhibited greater English phonological production skills. In addition, mother's Spanish language ability was shown to predict child's Spanish vocabulary knowledge. This finding supports the use of the native language in the home.

While phonological skill was a strength, language skills, as measured by the PV and MS subtests, were significantly below average. With the exception of the PE group in English, all children performed more than 1.5 standard deviations below the mean for both subtests in both languages, suggesting that they are not acquiring sufficient vocabulary knowledge to support academic learning in either language. It is suggested that delivery of adequate vocabulary instruction that meets the needs of these ELL children requires collaboration between teachers and speech-language pathologists.

Chapter One

Introduction

The Hispanic population currently represents the largest portion of second language speakers in the United States, making up 13% of the entire U.S. population in 2000 and a projected 16% by 2010 (2000 U.S. Census Bureau). In fact, census projections through 2050 estimate an average growth rate of approximately two percent per decade, making Hispanics the fastest growing language minority group in the country. For clinicians and researchers in California, Texas, New York, Florida, New Jersey, and Illinois, this trend is particularly noteworthy given that nearly 75% of all Hispanics reside in these states.

These trends in population growth are creating an increasingly diverse society, both culturally and linguistically. This diversity is mirrored in the demographics of local schools and requires educators to find new ways to serve a changing student body. According to the 2000 U.S. Census, 18% of the school-age population (ages 5-17 years) spoke a language other than English in the home. Further review of census data suggested that the number of English language learning (ELL) students has nearly doubled in the last decade. While as many as 329 different languages may be spoken by this ELL group, the majority (77%) of these individuals speaks Spanish at home (2000 U.S. Census Bureau). Consequently, schools are faced with the challenge of educating a growing population of Spanish-English bilingual children (including many children who are predominantly Spanish-speaking) who have specialized academic needs. Despite the

significant growth in this population, research has not provided sufficient information on the factors influencing literacy development in bilingual children.

The purpose of this paper, then, is to examine several factors believed to be important components of early literacy development and are of particular interest when talking about young ELL children. Phonological skill and vocabulary knowledge are among the most widely measured predictors of later reading ability and academic success in monolingual English-speaking children (Bowyer-Crane, Snowling, Duff, Fieldsend, Carroll, Miles, et al., 2008; Lindsey, Manis, & Bailey, 2003; Muter & Diethelm, 2001; Storch & Whitehurst, 2002; Storkel, 2006). However, few studies have examined these skills in the ELL population. In an attempt to better understand the early literacy development of dual language learners, this study examined the relationships among phonological skill, vocabulary development, and frequency of language use in preschool children who are ELL.

To begin, a review of literature was conducted to describe the characteristics of the variables addressed in this study. Phonological skill is discussed first, including a review of literature on the underlying phonological representations and production skills needed for ongoing phonological development, an overview of phonological acquisition in English and Spanish, and a discussion of phonological development as it relates to ELL children. Next, vocabulary knowledge is discussed in terms of its relation to literacy development, followed by a review of research on the vocabulary skills of cultural and linguistic minorities and a review of vocabulary development in ELL children. Several hypotheses are then explored to explain possible interactions between phonological skill and vocabulary knowledge. Subsequently, the influence of language exposure and usage

on the development of language and literacy skills is discussed. Finally, other child- and family-level variables believed to influence children's language development, including gender, socio-economic status, parent education level, and mother's language ability are discussed.

Phonological Skill

Phonology is the “domain of language that pertains to the elements of speech and the systems that govern the relationships among these elements within and across words” (Scarborough, 2002, p. 303). Phonological skills encompass a variety of abilities that, although similar in terminology, address different components along a continuum of skill development in this area. A hierarchy of phonological skills can be seen in the progression from the formation of phonological representations (underlying mental representations and the ability to produce the corresponding sounds) to the development of phonological awareness (manipulation of meaningful units in words) to the acquisition of phonemic awareness skills (discrimination of individual phonemes) (Bowyer-Crane et al., 2008; Scarborough, 2001; Sutherland & Gillon, 2005).

While the importance of phonological awareness and its relation to early reading development is well documented (Bus & van IJzendoorn, 1999), this skill represents only one aspect of important phonological abilities. In fact, it has been suggested that one's underlying phonologic representations are important precursors to phonological awareness and later development of reading (Catts, 2001; Foy & Mann, 2001; Snowling & Hulme, 1994; Sutherland & Gillon, 2005; Wesseling & Reitsma, 2001). The term *phonological representation* is commonly used to describe the way children store phonological information in their long-term memories (Sutherland & Gillon, 2005). The

establishment of distinct phonological representations may be considered as the foundation for ongoing phonological development and the processes by which we acquire and employ the sound patterns of a language.

Research in this area has termed these speech production skills “productive phonological knowledge,” referring to a child’s competence and performance employing the sound system of a language (Gierut, Elbert, & Dinnsen, 1987, p. 462). In fact, several findings have indicated that speech production difficulties were correlated with decreased attainment of literacy skills, such that children who demonstrated low phonological skill also exhibited low phonemic awareness skills (Foy & Mann, 2001; Sutherland & Gillon, 2005) and low reading ability (Catts, 2001).

Given its underlying importance, this study explores phonological skill in terms of phonological representations and subsequent production abilities. In order to understand phonological skill, as measured in terms of children’s ability to accurately produce phonemes in words and phrases, it is first necessary to understand phonological development as it occurs in both Spanish and English.

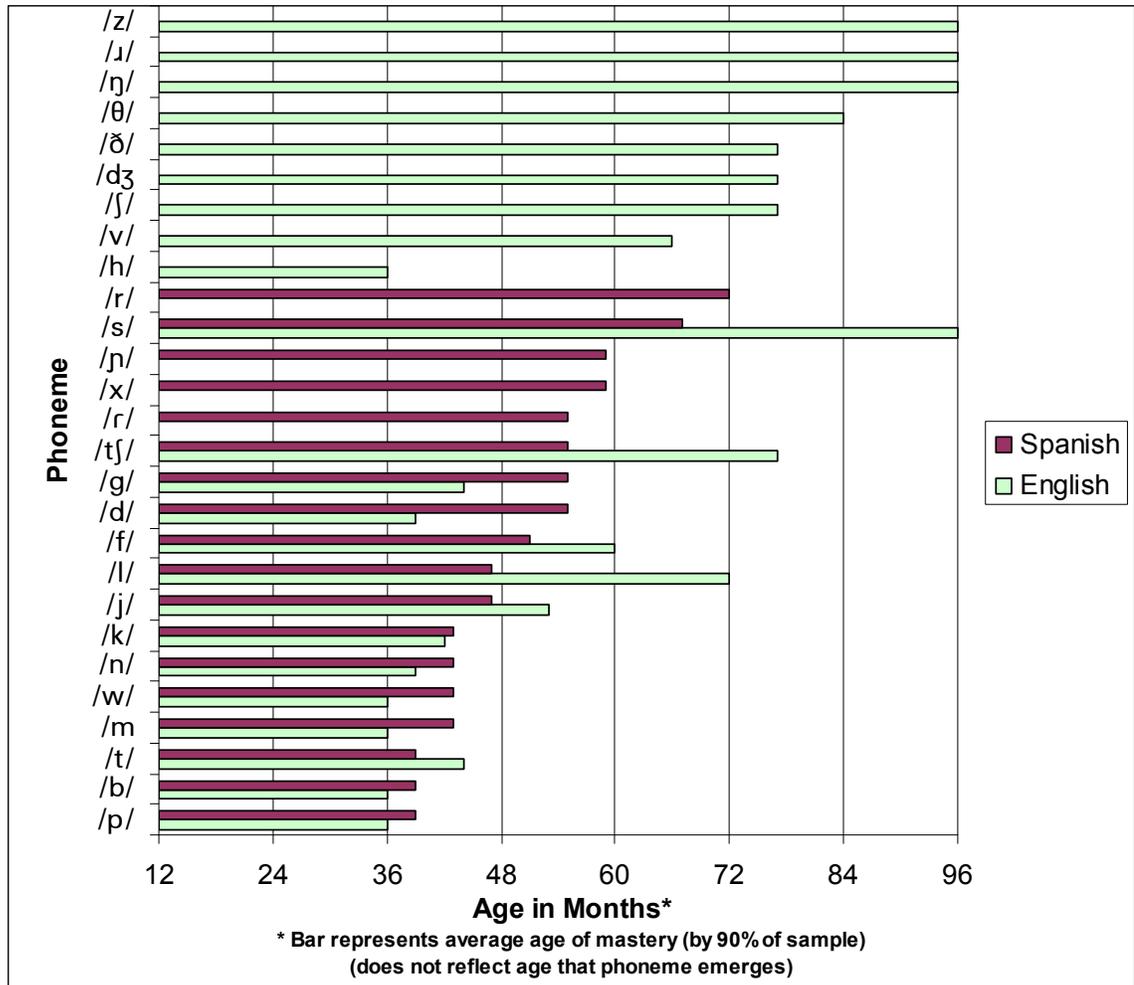
Phonologies in Spanish and English

There is limited research describing phonological acquisition in Spanish-speaking children. The available studies do not easily lend themselves for comparison given that each focused on geographically-different dialects (e.g. Mexico and Puerto Rico), studied children of different ages (e.g. two-year-olds, preschoolers, and young school-age children), or have examined children with varying amounts of exposure to English (Acevedo, 1993; Goldstein & Cintrón, 2001; Goldstein, Fabiano, & Swasey Washington, 2005; Jimenez, 1987; Miccio, López & Hammer, 2003). Findings across these studies,

however, generally support the idea that young Spanish-speaking children acquire phonetic inventories at rates comparable to speakers of other languages.

In a compilation of data from studies on phonological development (Templin, 1957; Sander, 1972), McLeod (2002) noted that English phonological development follows a universal order of acquisition of vowels, nasals, plosives, glides, liquids, affricates, and finally fricatives. Goldstein, Fabiano, and Iglesias (2004) outlined a similar order of acquisition of Spanish phonemes, with the exception that fricatives may be mastered before affricates in Spanish. In addition to acquiring phonemes in a comparable order, English- and Spanish-speaking children also acquire phonemes at similar ages. For instance, a study of 120 Spanish-speaking children of Mexican descent provided data on median ages (acquisition by 50% of the children) and upper age limits (acquisition by 90% of the children) for the production of Spanish consonants (Jimenez, 1987). Findings indicated a notable range in productions, with the greatest variability in age of acquisition occurring in latest developing phonemes. This work also cited a significant difference in the ages of acquisition of the tap /ɾ/ which was acquired by 50% at age 3:7 (years:months) and mastered by 90% at age 4:7, and the trill /r/ which was acquired by 50% at age 4:7, but still not mastered by 90% of the oldest children in the study at age 5:7. Similar data on ages of Spanish phoneme acquisition were noted in another study (Acevedo, 1993), indicating that by approximately age five, typically developing Spanish-speaking children mastered (>90% accuracy) the majority of sounds, with exception of: /g, f, s, ɲ, ɾ, r/. The ages of acquisition of Spanish consonants are presented in Figure 1 in comparison to norms for monolingual English-speaking children (Jimenez, 1987; Smit, Hand, Freilinger, Bernthal, & Bird, 1990).

Figure 1. Age of Acquisition of Consonants by Monolingual English and Monolingual Spanish Speakers



** trill r was not mastered by 90% of the children at the end of the study (age 5.7)

As illustrated in Figure 1 above, the rate and pattern of phonological acquisition for monolingual Spanish-speakers is comparable to monolingual English-speaking children. In comparison to Spanish norms, the well known Iowa articulation project norms suggest that typically developing monolingual speakers of English have mastered the majority of phonemes by age six (Smit, et al., 1990). It is likely that similarities in

patterns of acquisition are due, in part, to the fact that Spanish and English share many of the same phonemes (see Table 1) (Goldstein, Fabiano, & Iglesias, 2004).

Table 1. *Shared and Unshared Phonemes in English and Spanish*

	Bilabial	Labio-Dental	Inter-Dental	Alveolar	Palatal	Alveo-Palatal	Velar	Glottal
Stops	/p/ /b/			/t/ /d/	/ɲ/		/k/ /g/ /ŋ/	
Nasals	/m/			/n/				
Fricatives	/β/	/f/ /v/	/θ/ /ð/	/s/ /z/	/ʃ/ /ç/		/x/ /χ/	/h/
Affricate						/tʃ/ /dʒ/		
Liquid				/l/				
Glides	/w/			/ɹ/	/j/			
Tap				/ɾ/				
Trill				/r/				
Key:								
	= Phonemes unique to Spanish							
/ /	= Phonemes unique to English							
/ /	= Shared phonemes							

(Adapted from: Goldstein, Fabiano, & Iglesias, 2004)

Table 1 illustrates shared and unshared phonemes in each language by place and manner of articulation. One-half of the phonemes and allophones found in the phonologies of English and Spanish are shared by both languages. With regard to phonemes found in both languages, 90% of children at age 5 have mastered all shared phonemes, with the exception of /tʃ, s, l/, which are acquired later in English than in

Spanish. There are only six phonemes in Spanish that do not exist in English, while a total of ten phonemes are unique to English phonology. It should be noted that the majority of unshared phonemes in English are mastered later than the unshared phonemes in Spanish. These late-developing English phonemes include /s, z, ʃ, ŋ, ð, θ/.

Although many speech sound commonalities exist between English and Spanish, there are some phonological differences which may play a role in the development of phonetic inventories and the use of phonological rules by children acquiring more than one language at the same time (Jimenez, 1987). English plosive phonemes /b/, /d/, and /g/, have fricative allophones; specifically, /β/, /ð/, and /ɣ/ in Spanish. Spanish phonological rules dictate the use of the allophone in the intervocalic position, but the target phoneme is produced in the initial position of words. This process is known as spirantization, where a stronger consonant assimilates to a softer allophone in specified contexts (Edwards & Shriberg, 1983). Examples of spirantization can be seen in the production of the Spanish words *pagar* as /paɣar/ (to pay), *nada* as /naða/ (nothing), and *bebida* as /beβiða/ (drink). In each of these cases, the plosives in Spanish soften to homorganic fricatives in the intervocalic position (Canfield, 1981; Edwards & Shriberg, 1983). A complete list of Spanish allophones is included in Table 2. Another important phonological difference between English and Spanish is the phoneme /r/, which is produced with several variations between the two languages. In Spanish, “r” can be pronounced as a tap /ɾ/ as in /peɾo/ (*pero*, “but”) or as a trill /r/ as in /pero/ (*perro*, “dog”). In English, “r” is pronounced as a glide /ɹ/ as in /ɹʌn/ (run) or as a rhotic diphthong in the postvocalic position as in /kɑɹ/ (car) (Small, 1999).

Table 2. *Phonemes and Allophones in Spanish*

Phoneme	Allophones	Syllable Position	Orthographic Symbol
/b/	/b, β/	Initial, Medial	b or v
/d/	/d, ð/	Initial, Medial, Final	d
/g/	/g, γ/	Initial, Medial	g
/x/	/x, h/	Initial, Medial, Final	j
/w/	/w, u, gw/	Initial	w, hu, gu
/j/	/j, dʒ/	Initial, Medial	hi or y
/r/	/r, x/	Initial	r or rr
/ɾ/	/ɾ, l/	Initial	r

(Adapted from: Goldstein & Iglesias, 1996)

While the phonologies of Spanish and English are similar in many ways, there are also important distinctions, including phonemes and allophones that are not shared between the two languages. Young ELL children are faced with the challenge of learning these differences often at the same time they are mastering the phonological representations of their two languages.

Phonological Development in ELL Children

In a review of related research, Anderson (2004) noted that only in the past two decades have studies on phonological development in second language learners shifted from a focus on adults to begin exploring the acquisition of two phonologies by young children. Investigating the development of phonological representations in ELL children requires an understanding of the way phonological acquisition occurs in the presence of two languages. Several models of bilingual phonological representation have been proposed in recent decades (Goldstein & Gildersleeve-Neumann, 2007).

The Interactive Dual Systems Model (IDSM) is currently the most widely accepted model of phonological acquisition for ELL learners and it provides a

compromising alternative to the two older models (e.g. Unitary System Model and Dual Systems Model) which offered less dynamic explanations for the interactions of the two languages (Goldstein & Gildersleeve-Neumann, 2007). The IDSM purports that young bilingual children develop separate systems from birth, but suggests that both phonological systems interact with each other. Support for the IDSM comes largely from Paradis (2001) and her observation of what she terms “interlanguage structural ambiguity,” or characteristics that emerge in a child’s language usage, but are not part of either of the child’s two spoken languages. In other words, there is interdependence across the systems with each one influencing the other such that a child may internalize components of his languages to create unique features that share grammatical properties of both languages, but are not found in either of his languages. In light of these unique interactions between the two phonological systems, the impact of dual language exposure on young children’s phonological acquisition is commonly called into question.

In an attempt to answer this question, however, it has been suggested that phonological acquisition is not impaired or inhibited by the co-existence of two languages (Vihman, 2004). One study noted that bilingual five-year-olds demonstrated comparable phonological skills to the predominantly English-speaking and predominantly Spanish-speaking children in their study (Goldstein et al., 2005). Investigations examining the development of phonology at the segmental and syllable levels have found that, regardless of the two languages heard, bilingual infants and toddlers tend to produce stops, nasals, and glides in consonant-vowel (CV), vowel (V), and CVCV combinations with front vowels (Zlatic, MacNeilage, Matyear & Davis, 1997). In their study of phonological skills among ELL preschool children with varying

degrees of language dominance, Goldstein, Fabiano and Swasey Washington (2005) also found no significant differences in segmental accuracy, syllabic accuracy, or percentage of occurrence of phonological patterns between predominantly-Spanish speaking and bilingual children in Spanish, nor between predominantly-English speaking and bilingual children in English.

Regardless of the approach used to examine rates of phonological development in bilingual children, research has suggested that, despite differences in the phonologies across languages, overall attainment of a complete phonetic inventory occurs at approximately the same rate for ELL children as it does for monolingual children (Anderson, 2004; Vihman, 2004; Yavas, 1995). Since the phonological skills of young children can be measured in a variety of ways, it is necessary to explore some of the approaches used by studies that have attempted to assess phonological production skills.

Measuring Phonological Production Skills

Credited with pioneering research in this area, Ingram and Ingram (2001) introduced a novel approach to measuring phonological acquisition in terms of whole-word productions. Their purpose was to document changes in the phonological complexity of children's productions and intelligibility over time. Ingram and Ingram (2001) outlined four measures designed to assess children's abilities to produce whole words: phonological mean length of utterance (PMLU), proportion of whole-word proximity (PWP), proportion of whole-word correctness (PWC), and proportion of whole-word variability (PWV). Of particular interest in the present study are the PMLU and PWP measures. Ingram's PMLU is used to measure the complexity of child and adult targets and is a central component to each of the other measures. Specifically,

PMLU measures the length of a child's word (complexity) and the number of consonants produced correctly. PWP examines the relationship between the child's PMLU and the adult target PMLU, thereby providing evidence of how closely the child's production matches the target word. Ingram and Ingram suggested that PWP may also be used as an indirect measure of speech intelligibility given that it establishes a comparison between the child's word approximation and an expected target.

Since its introduction, PMLU has been used to compare patterns of phonological acquisition in children from a variety of cultural and linguistic background (Polite & Leonard, 2006; Saaristo-Helin, Savinainen-Makkonen, & Kunnari, 2006). Polite and Leonard's (2006) research interest was to examine finite verb morphology in children with specific language impairment (SLI). In order to look at the morphological skills of children with SLI, the authors first needed to assess whether the children were capable of producing words of sufficient length to support grammatical morpheme use. To accomplish this, they used PMLU (e.g. measure of the length of words and number of consonants correct) in order to match preschoolers with SLI to younger typically developing children on the basis of their phonological skill. Polite and Leonard (2006) found that, despite comparable phonological skill, as measured by PMLU, children with SLI demonstrated less use of morphological markers for tense/agreement than their PMLU-matched peer group.

Another study employed both the PMLU and PWP measures with a group of monolingual Finnish-speaking children (Saaristo-Helin, et al., 2006). These researchers sought to examine phonological variation in the early word-learning productions of young children (1-2 years old) as well as to compare Finnish phonological data to PMLU

data in other languages. The authors found Finnish PMLUs to be relatively high and noted that they were more than 2.5 points higher than the findings from the Ingram (2002) study in English. Saaristo-Helin et al. (2006) cited that the majority (79%) of words used by Finnish children were bisyllabic, 13 percent multisyllabic, and only 8 percent were monosyllabic, compared to English-speaking children who target primarily mono- and bisyllabic words in the early stages of word learning. The authors also noted that PMLU and PWP scores for the Finnish children were closer to the scores from five children learning Spanish, which, they suggested, may be due to the fact that Spanish words tend to be longer than English words on average. The authors did caution, however, that the Spanish-speaking children were slightly older (1.2 – 2.0 years old) than the Finnish children.

In another study, PWP was included in a battery of phonological measures looking at differences in phonological development among boys with Fragile X Syndrome and Down Syndrome as compared to typically developing boys (Roberts, Long, Malkin, Barnes, Skinner, Hennon, et al., 2005). Using the PWP measure, Roberts et al. were able to describe differences in phonological performance between each of the groups. They noted that although boys with Fragile X Syndrome had speech delays, they did not differ significantly from typically developing, mental age-matched peers in terms of percentage of consonants correct or PWP scores. In contrast, boys with Down Syndrome were found to have delayed speech in addition to significantly lower PWPs, suggesting lower phonological skills than their younger, typically developing peers.

Another approach to measuring phonological skill has been to examine the percentage of consonants in a child's inventory (PCI), or completeness of phonetic

inventory (CPI). Measures assessing phonetic inventories have been used to describe the rate and patterns of phoneme acquisition in late-talking children (Williams & Elbert, 2003) and to examine the phonologic development of young toddlers with cleft palate who presented with expressive language delays (Morris & Ozanne, 2003). Williams and Elbert (2003) followed a group of five late-talking preschoolers monthly for one year. They used phonetic inventory measures to identify both quantitative markers (limited phonetic inventory, low percentage of consonants correct, and more sound errors) and qualitative markers (atypical error patterns, greater sound variability, and slower rate of resolution) of a potentially long-term phonological delay.

In another study, Morris and Ozanne (2003) split twenty children with cleft palate into two groups, one with delayed expressive language (8-12 month delay) and one with normal language development. The authors assessed children in both groups using measures of language expression and comprehension, as well as phonetic inventory data obtained from a spontaneous speech sample. They found significant differences between the two groups with regard to expressive language ability, percentage of consonants correct, phonetic inventory, and the presence of phonological processes.

Studies looking at the phonological skills of Spanish-speaking and Spanish-English bilingual children have also used similar measures to assess the percentage of consonants correct in children's inventories (Goldstein, 2007; Goldstein & Cintrón, 2001; Goldstein & Swasey Washington, 2001). Goldstein (2007) investigated the phonological skills of Spanish-speaking children with phonological disorders from two different dialects (Puerto Rico and Mexico). He found no significant differences on measures of consonant accuracy or phonetic inventory between the two groups. In like fashion,

Goldstein and Swasey Washington (2001) examined the phonological skills in English and Spanish of twelve typically developing bilingual preschoolers. Using measures of phonetic inventory completeness, percentage of consonants correct, and percentage of phonological processes, the authors found no significant differences between the children's use of phonemes across the two languages on any of the measures.

Phonological ability has been studied in a variety of ways for a range of populations in an effort to document children's growth in acquiring necessary skills for ongoing phonological development. Regardless of how phonological skill was measured, the ability to represent and produce the phonemes of one's language was an important indicator of how children were acquiring the foundational skills for ongoing language learning. In fact, it has been suggested that the strength of phonological representations begets future language learning abilities in a range of other areas, including vocabulary development and the acquisition of word meanings (Burns, Werker, & McVie, 2002).

Vocabulary Knowledge

In addition to phonological skill, vocabulary is an essential building block for early literacy development (National Reading Panel, 2004). Recent research has well documented that children need sufficient vocabulary knowledge both to learn to read and in order to understand what they are reading (Gillam & Gorman, 2004; Scarborough, 2001; Troia, 2004). One longitudinal study noted that Head Start children's vocabulary performance was the strongest predictor of later reading comprehension ability in fourth and seventh grade (Tabors, Snow, & Dickinson, 2001). More recently, a similar large-scale study of 533 preschool age children found vocabulary to be as strong a predictor of

print knowledge as phonological awareness (Dickinson, McCabe, Anastasopoulos, Peisner-Feinberg & Poe, 2003).

While there is little debate over the importance of vocabulary in early language development for monolingual English speakers, there is a paucity of research on the development of vocabulary skills among monolingual Spanish-speaking children and ELL children. However, related research in this area has been conducted to examine English vocabulary development in other minority populations. For example, studies have examined the vocabulary skills of children from low socio-economic backgrounds, a population often characterized by a disproportionate number of cultural and linguistic minority children (FACES, 2003). Another recent focus of the research on vocabulary development in minority populations has been to examine the vocabulary skills of African-American (AA) children in comparison to national norms. Some limited research comparing the performance of AA children and Spanish-speaking children will be reviewed for comparative purposes.

Among the largest research efforts in this area, the U.S. Department of Health and Human Services' Administration for Children and Families is currently conducting a longitudinal study of a nationally representative sample of 3- and 4-year old children in Head Start (www.acf.hhs.gov/). The study, *Family and Child Experiences Survey* (FACES), was commissioned to measure child outcomes and assesses programs' success in meeting children's school readiness needs. The latest FACES data report was released in 2003 and included findings for a sample of 2,800 children in 43 Head Start programs nationwide (FACES, 2003). This population is often considered to have a disadvantage with regard to the attainment of early literacy skills. According to their report, the typical

Head Start child entered the program with a vocabulary level at the 16th percentile as compared to a normative sample of U.S. children of the same age. ELL children comprised 33% of the FACES 2003 sample and, of these children, 86% spoke Spanish. For the Spanish-speaking children in particular, the report noted that this group showed significant gains in English vocabulary skills (mean standard scores increased from 81.4 in the fall to 86 in the spring). Although significant gains were made on average by children from program entry to exit, most Head Start children were reported to exit the program with vocabulary scores still below the national average.

These findings mirror the results of other studies examining vocabulary performance among low-income and other minority groups (Champion, Hyter, McCabe, & Bland-Stewart, 2003; Páez, Tabors, & López, 2007; Restrepo, Schwanenflugel, Blake, Neuharth-Pritchett, Cramer, & Ruston, 2006). A widely-cited study of the influence of socio-economic status (SES) concluded that poverty is a variable that inhibits vocabulary development in all ethnic and racial groups (Hart & Risley, 1995). The authors of the study provided evidence of this disparity, noting that by age four, “an average child in a middle class family would have accumulated experience with almost 45 million words... [but] an average child in a welfare family would have accumulated experience with 13 million words” (p. 198). In addition to these great quantitative differences in vocabulary exposure, the same authors noted qualitative differences in language input. They found that 80% of the language input received by children from low SES backgrounds was discouraging or prohibitive in nature and therefore not likely to result in vocabulary expansion.

In addition to SES status, membership in an ethnic minority group can also unfairly bias children's performance on standard measures of vocabulary. Research in recent years has documented that African-American (AA) children, for example, scored lower than European-American children when controlling for age and gender (Restrepo, et. al., 2006) and that AA children scored lower than the test's normative sample (Champion et. al., 2003). Two additional studies noted that African-American preschoolers performed between one standard deviation (*SD*) (Campbell, Bell, & Keith, 2001) and 1.5 *SD* (Qi, Kaiser, Milan, & Hancock, 2006) below the mean based on national norms. Qi et al. noted that when using the vocabulary measure examined in their study, children were more likely to be identified as having language disorders than when assessed using other standard language measures. In a similar study, Stockman (2000) suggested that the performance of minority children on standardized measures of vocabulary may be due to a variety of factors, including the language and vocabulary experiences a child brings from home (e.g. often discussed in terms of SES status), specific content or cultural information required by the test, and the type of materials used (e.g. words tested, picture stimuli used) in the assessment process.

Given that studies have shown that children from cultural and linguistic minority groups performed lower on standard vocabulary measures, it is a reasonable assumption that ELL children may suffer a similar plight. To explore this premise, studies comparing the performances of Spanish-speaking and African-American children were reviewed. One study explored possible cultural and linguistic biases of an expressive vocabulary measure as evidenced by the performance of monolingual Spanish-speaking (Costa Rican, $n=29$) and African-American ($n=26$) preschool and school-age children from

families classified as middle or low SES (Wyatt, Fasnacht, Huntley Bahr, & Champion, 2006).

These researchers found that the AA group's mean performance fell in the low normal range, with five children (19% of the sample) scoring 1.5 *SD* below the mean. Errors made by the African-American children were largely taxonomic errors with subordinate substitutions (e.g. "daisy" for "flower") occurring most frequently. The authors found, however, that of the 12 items systematically missed by more than half the children, responses to eight items were verified by adults as appropriate answers given the culture. In other words, children's responses were considered as errors when in fact their answers were synonymous with the target word in their dialect. Similar results were found for the Spanish-speaking children. More than half of the Costa Rican children scored more than 1 *SD* below the mean. Eleven items were missed by more than half the Costa Rican children, with subordinate and coordinate (e.g. "mouse" for "kangaroo") substitutions frequently occurring. It was noted that five of the eleven items missed by these children were also incorrectly named by Costa Rican adults, suggesting that these words were not familiar to individuals in this culture. Although the Spanish-speaking and African-American children in this study performed slightly differently, both groups were significantly below average in comparison to national vocabulary norms when assessed with the standardized vocabulary measure.

Two recent studies have corroborated the findings that Spanish-speaking ELL children are at risk for attaining low levels of vocabulary skills (Páez, et al., 2007; Tabors et al., 2003). Páez, et al. (2007) recently conducted a large-scale study to compare the oral language (including a measure of vocabulary) and early literacy skills of Spanish-

English bilingual children living in the U.S. and monolingual Spanish-speaking children in Puerto Rico. They found that the bilingual children performed below average in both languages when compared to monolingual peers. The authors also cited that, despite some gains documented during the preschool years, the bilingual children still performed lower than monolingual children in each language in kindergarten. It was also noted that the monolingual Spanish-speaking children had significantly higher Spanish vocabulary skills (but lower phonological skills) than the bilingual group. Páez et al. suggested that the lower phonological skills of the monolingual Spanish-speaking children may be due to the lack of phonological awareness instruction in Head Start classrooms in Puerto Rico. In a previous study of the same population, Tabors, Páez, and López (2003) described a negative correlation across languages for children's performance on a vocabulary measure, such that children who scored higher in Spanish, scored lower in English and vice versa. Given the importance of this finding, Tabors et al. noted that further research is needed to determine if these children are losing their Spanish vocabulary as they acquire more English or whether, with appropriate home and school supports, they will be able to continue to develop skills in both languages. In an effort to better understand these findings, further discussion of vocabulary development as it relates specifically to ELL children is warranted.

Vocabulary Knowledge and ELL Children

As described above, numerous studies have documented that cultural or linguistic minority groups perform significantly lower on standard measures of vocabulary as compared to their peers. Recently, researchers confirmed that bilingual children also consistently performed lower on standardized language tests, including assessments of

vocabulary, than do monolingual English-speaking children (August, Carlo, Dressler, & Snow, 2005; Peña, Bedore, & Rappazzo, 2003). Several studies using standardized tests that measure each language individually have found that, when compared to their monolingual peers, preschool and school-age children who are learning two languages have smaller vocabularies in each of their languages (Nicoladis & Genesee, 1996; Páez, et al., 2007; Umbel, Pearson, Fernández, & Oller, 1992). However, some researchers argue that this one language assessment approach does not adequately capture a child's true language ability and vocabulary skill (Pearson, Fernandez, & Oller, 1993). Given that ELL children often develop lexical knowledge unique to each of their languages, and that they access this information differently over time with increased proficiency in each language, single language assessments do not credit bilingual children for all of the semantic knowledge inherent in their complete linguistic repertoire (Bialystok, 2001; Kohnert & Bates, 2002).

In an attempt to balance this disparity while assessing vocabulary in bilingual children, some have suggested that using an approach called conceptual scoring provides a more complete picture of a child's vocabulary level by giving credit for unique words across both languages (Bedore, Peña, Garcia, & Cortez (2005); Pearson et al., 1993). Pearson et al. (1993) described conceptual scoring as “scoring the meaning of a response regardless of the language in which it is produced. Therefore, if when describing a ball, a child said, *‘It’s red and blue y tiene una raya y una estrella’* (It’s red and blue and has a stripe and a star), she would achieve a monolingual score of two in English or Spanish but a conceptual score of four because she expressed unique concepts in each language” (Bedore et al., 2005, p. 190). As illustrated in the example, conceptual scoring provides a

more detailed picture of ELL vocabulary development by giving credit for total language concepts rather than assessing each language individually. Studies that have measured combined vocabulary size, accounting for unique knowledge across both languages, have found comparable vocabulary skills between ELL and monolingual children (Alvarado, 2000; Marchman & Martinez-Sussman, 2002).

Another important factor that characterizes vocabulary acquisition (and how it is measured) among ELL children is the occurrence of translational equivalents (Genesee, Paradis, & Crago, 2004). Genesee et al described translational equivalents as words or concepts that exist in a child's vocabulary that have the same meaning in both languages (e.g. "dog" and "perro" are translation equivalents for the four-legged family pet). In addition to influencing patterns of acquisition, translational equivalents also impact the way in which children use specific words in each language to represent unique aspects or variations of a concept. In other words, children may use translational equivalents in order to make semantic distinctions; for example, a child might use "*pan* referring to rolls and sweet breads and *bread* for making sandwiches or toast" (Bedore, et al., 2005; p.189).

The existence of translational equivalents has been cited in Spanish-English, Portuguese-English, and French-English bilinguals and they have been seen to appear in very early stages of language development, even before ELL children have acquired 50 words in their vocabularies (Nicoladis & Secco, 2000). One study examining overlapping vocabularies among young bilingual children learning to speak, found fluctuating levels of translation equivalents ranging from a high of 67% at the initial production of words to a low of 10% by the acquisition of the first 50 words and then

increasing again to 44% by the age of one year, ten months (Deuchar & Quay, 2000). As such, educators and practitioners should be cautioned against expecting bilingual individuals, especially ELL children, to have a translation equivalent for each word in their vocabulary. Although competent bilinguals may never reach the point where translation equivalents make up 100% of their vocabularies, the number of single words (without a translation equivalent) decreases significantly over time. For example, a study of bilingual students at the college level noted that single words still accounted for ten percent of students' vocabularies (Pearson, 1998).

Given the way in which ELL children acquire and use their vocabularies in their two languages, it may not be adequate to compare the total lexical knowledge of a bilingual child in one language to that of a monolingual child's vocabulary. Therefore, measuring vocabulary development in ELL children is more complicated than measuring that of monolingual children and estimates often vary depending on how words are counted in each of the languages. In addition to the challenge of how to best measure a child's vocabulary skill, there are other important factors believed to influence the rate and pattern of vocabulary acquisition in dual language learners, including gender and the interaction between other acquired skills.

Gender has been cited in several studies as a factor affecting various aspects of language development that may be linked to vocabulary knowledge, including verbal fluency, confrontation naming, verbal comprehension, and production abilities (Berglund, Eriksson, & Westerlund, 2005; Bornstein, Haynes, & Painter, 1998; Locke, Ginsberg, Peers, 2002). With regard to its impact on vocabulary specifically, one study cited evidence of gender differences in early vocabulary growth (Huttenlocher, Haight, Bryk,

Seltzer, & Lyons, 1991). In this study, in addition to being more talkative, girls demonstrated more rapid vocabulary growth and had a greater type/token ratio (the number of different words from the total number of words used in given language sample) than did the boys. In two other large-scale studies investigating gender effects on vocabulary growth development among children ages 8 to 30 months, females had a slight advantage over males, with gender explaining from one to three percent of the variance (Fenson, Dale, Reznick, Bates, Thal, & Pethick, 1994; Galsworthy, Dionne, Dale, & Plomin, 2000). These findings suggest that gender may play a role in young children's vocabulary development.

Interpreting information on vocabulary development requires consideration of a variety of factors. Among these factors, adequately measuring a child's conceptual vocabulary knowledge across languages and understanding the role of translational equivalents, and the influence of gender must be taken into account. Still, the below average performance on vocabulary skills in culturally and linguistically minority children, including dual language learners, has been well documented (Champion et al., 2003; FACES, 2003; Páez et al., 2007; Restrepo et al., 2006). This is of great concern given that vocabulary knowledge is necessary for the attainment of ongoing literacy skills. Together, vocabulary knowledge and phonological skills are among the strongest predictors of reading ability throughout the school-age years (Tabor et al., 2001). Research has established the importance of these two variables, with each contributing to a foundation for later skills, including phonological awareness, word learning, and reading comprehension. Given the fact that phonological skills and vocabulary knowledge are developing simultaneously and that they comprise part of a larger

compilation of literacy skills, the possibility of an interaction between the two must be explored.

Interaction Between Phonology and Vocabulary

Several hypotheses have been proposed to explain the relationship between vocabulary and phonology. One assertion has been that as vocabulary size increases, “lexical representation becomes more completely specified and/or segmental over time” (Garlock, Walley, & Metsala, 2001, p. 473). This is to say that as children learn new words, they are forced to create new phonological representations to distinguish between newly acquired lexical information. Interpreted in this way, vocabulary growth is believed to spur phonological development. Research supporting this notion has suggested that children may be more likely to produce new words that contain sounds in their existing phonetic repertoire than words with sounds they can not produce (Edwards, Beckman, & Munson, 2004; Velleman & Vihman, 2002). Sutherland and Gillon (2005) also noted that when lexical representations become stored in more segmented ways, children demonstrate increasing ability to perform phonological awareness tasks.

A second explanation suggests that this interaction occurs in the opposite direction such that phonological development drives lexical development (Schwartz & Leonard, 1982). More recent research on the recognition of words among infants and toddlers indicates that it is the early-learned phonetic details of a child’s repertoire that aid in recalling words and acquiring new lexical representations (Swingley, 2005; Swingley & Aslin, 2002). Swingley and Aslin (2002) noted that the toddlers in their study performed exceptionally well on tasks testing the discrimination and categorization of meaningless syllables. The authors concluded that the phonological representations of

these young children included far more detail than was needed to distinguish the words in a child's vocabulary at this age. They therefore suggested that infants and toddlers use their detailed representations and perceptual abilities to build a vocabulary and learn new word meanings.

The third hypothesis is that the relationship between phonological skill and vocabulary is bidirectional and more interdependent in nature (Maekawa & Storkel, 2006). This assertion seems more likely given the dynamic nature of child development and has recently been investigated by a number of studies. Findings in this area suggest that the relationship between the two variables is complex and is influenced as well by other factors, including chronological age (Smith, McGregor, & Demille, 2006), individual differences among children (Maekawa & Storkel, 2006), and the type of task or assessment used to measure children's abilities (Munson, Swenson, & Manthei, 2005).

Whatever the direction of the interaction, it seems likely that vocabulary and phonology interact on some level. It is also believed that both vocabulary knowledge and phonological skill are, in turn, influenced by a range of variables including a child's exposure and experience with each of these skills. For ELL children, developing phonological skill and vocabulary knowledge involves an added layer of complexity given the presence of two sets of skills for each language. Of particular importance in understanding dual language development, then, is the age of exposure to the second language. For sequential language learners, acquisition in each of the languages depends on several factors including the child's vocabulary and phonological skill in L1, the age of exposure to L2, and the majority/minority language status of L2 (Cenoz, 2003; Goldberg, Paradis, & Crago, 2008). The combination of these factors ultimately

influences children's abilities in the second language and can be described in terms of amount of language exposure and frequency of language use.

Language Exposure and Frequency of Use

It has been suggested that the ability to comprehend language and to communicate using spoken language, is among the earliest influences driving emergent reading skills (Cummins, 1994). Furthermore, a report of the NICHD Early Childcare Research Network (2005) cited that early reading ability is influenced by one's language ability and emergent literacy skills. Yet, despite widespread attempts by public schools to measure language proficiency, little empirical consensus has been reached on how to define, and subsequently measure, children's skills in a second language. As an alternative to trying to measure second language skills, it has been suggested that the language skills of dual language learning children can be described in terms of the amount of exposure to and frequency of use of the second language (Goldberg et al., 2008; Pearson, Fernandez, Lewedeg & Oller, 1997). Researchers attempting to describe language skills in this way often turn to parents for information on the characteristics of language use of their children (Goldstein et al., 2005; Peña et al., 2003). Studies have shown that parent reports can be a reliable source of information when attempting to describe children's language skills based on the amount of language exposure and use (Gutierrez-Clellen & Kreiter, 2003). In fact, in their research exploring the reliability of parent reports of language input and use at home and school, Gutierrez-Clellen and Kreiter (2003) found high correlations between parent estimates of Spanish input and use and grammatical performance in that language.

Therefore, parent report of children's language use may provide valuable insight into children's language ability. As an example, previous work examining amounts of language output (as determined by parent report) among ELL children cited that, in order to be considered competent speakers of both languages, at least twenty percent of a child's spoken output should occur in each respective language (Pearson et al., 1997). Other research has used language status profiles based on years of exposure, subjective proficiency ratings, amount of input, and amount of output in order to describe children's language use in studies examining phonological ability (Goldstein et al., 2005) and lexical skills (Peña et al., 2003).

The developing dual language skills of ELL children are of particular importance given that a "reciprocal and robust association" exists between language ability and early literacy development (Justice, Chow, Cappellini, Flanigan, & Colton, 2003, p. 321). Specifically, development of language skills supports the attainment of higher level literacy skills, such as principles of print, phonological awareness, and emergent writing. While some findings suggest that language ability has only an indirect influence on word decoding and reading performance in early elementary school (Storch & Whitehurst, 2002; Whitehurst & Lonigan, 1998), other researchers have cited evidence that language skills play a crucial role in reading development (Bishop, 1991; Share & Leikin, 2004). Longitudinal evidence has further indicated that development of strong language skills is an important precursor to ongoing literacy development (Storch & Whitehurst, 2002). Frequency of language use is therefore examined in this study to explore its relationship to phonological skill and vocabulary knowledge for ELL children.

Importance of Language Exposure and Use for ELL Children

Research has indicated that English language skills are a necessary precursor to literacy for monolinguals (Dickinson & Tabors, 2001), as well as bilinguals (August & Shanahan, 2006; Oller & Pearson, 2002). Other research has found that monolingual children who demonstrated high levels of word recognition and spelling exhibited strong phonological skills (Storch & Whitehurst, 2002). Given the cross-linguistic transfer of language skills, it has been suggested that ELL learners who exhibit limited language skills their L1 experience slower acquisition of phonological skills in L2 (Cárdenas-Hagan, Carlson, & Pollard-Durodola, 2007). Likewise, ELL children with strong phonological abilities in L1 often demonstrate cross-language transfer of this ability to L2 (Durgunoglu, 2002). While ELL children with strong phonological abilities in their first language may reap the benefits of cross-linguistic transfer in acquiring the second language, ELL learners who exhibit limited L1 language skills, experience slower acquisition of phonological skills in L2 (Lopez & Greenfield, 2004).

In a review of research related to literacy development and bilingual children, Bialystock (2002) pointed out that literacy acquisition often takes place in a weak second language among bilingual children. Several authors have found that ELL children require between four and seven years of second language exposure to match the level of their peer group in academic achievement, and between two and five years of exposure to match their oral language skills (August & Hakuta, 1997; Cummins, 1991; Hakuta, Butler, & Witt, 2000). While much attention has been given to exploring the language components that contribute to literacy development (Bowyer et al., 2008; Bus & van IJzendoorn, 1999; Swanson, Trainin, Necochea, & Hammill, 2003), there has been

relatively little discussion of how these variables interact in children from diverse linguistic backgrounds who are learning to speak, read, and write in more than one language at the same time. Although research has linked phonological abilities and vocabulary development with early literacy skills in English-speaking children (Bus & van IJzendoorn, 1999), few studies have examined this relationship with the ELL population. The dearth of research with the ELL population creates a significant challenge for teachers and speech-language pathologists attempting to identify appropriate means for assessing and educating these children.

Family-Level Variables

The importance of the role that parents and caregivers play in the early formative years of a child's life can not be underestimated. A visit to any Head Start or preschool program will likely find family-focused services at the core of good early childhood education practices. Given the importance adults have in the lives of young children, it is not surprising that many attempts have been made to understand a range of family-level variables as they relate to early childhood and early literacy development (Hart & Risley, 1995; Hoff & Tian, 2005; Locke et al., 2002; Westerlund & Lagerberg, 2008). Among commonly reviewed factors are socio-economic status, parent education level, home language use, as well as a number of home literacy characteristics, including number and types of books in the home, home literacy environment (existence of literacy materials and how adult language models are using them), frequency of reading, and quantity and quality of language interactions in the home, to name a few (Hammer, Miccio, & Wagstaff, 2003; Hart & Risley, 1995; Westerlund & Lagerberg, 2008). Several family-

level variables, as they relate to children's phonological skill and vocabulary development, are discussed in this section.

The relationship between socioeconomic status (SES) and vocabulary development has been widely studied (Bornstein, et al., 1998; Hoff-Ginsberg, 1998; Locke, et al., 2002). Research findings have suggested a strong relationship between the two, such that children of mothers with higher SES have been found to have significantly higher productive vocabulary skills (Hart & Risley, 1995; Hoff & Tian, 2003). Research on other variables, including parental education levels, noted that higher maternal education, higher maternal age, and good communication were all significantly related to increased reading frequency in the home (Westerlund & Lagerburg, 2008). Additional findings from the same study noted a significant relationship between maternal education and children's expressive vocabulary skills. A related study cited several interesting predictive relationships between family level variables and child vocabulary performance (Bornstein, et al., 1998). Bornstein et al. (1998) found that in addition to child gender (females scored higher) and child social competence, mother's vocabulary skill predicted both the child's comprehension of vocabulary and child's performance on two measures of vocabulary production. This same study also noted that SES had a positive influence on maternal vocabulary levels.

Mother's language use has also been cited as an important variable in children's language acquisition, both in terms of quantity of language used (Smolak & Weinraub, 1983) and the type and quality of the language used (Girolametto, Weitzman, Wiigs, & Steig Pearce, 1999). Related research on the amount of exposure on young children's language acquisition revealed a significant correlation between the number of utterances

produced by mothers and the number of words produced by their children during play sessions (Tomasello, Mannle, & Kruger, 1986). Still other research has examined the effect of language exposure on production abilities among young children (Huttenlocher, et al., 1991). A study examining this relationship noted that parental speech input accounted for a substantial amount of the variance for vocabulary size and rate of acquisition in two groups of children each followed longitudinally from 14 to 26 months (group 1) and from 16 to 24 months (group 2) of age (Huttenlocher et al., 1991). Given the influence of these environmental factors and family characteristics, family-level variables will also be explored in this study as they relate to children's skill development.

Purpose of the Present Study

The development of early literacy skills encompasses a range of abilities, including phonological skill, vocabulary knowledge, and language ability, among others. Phonological skill and vocabulary knowledge, in particular, are often measured and studied as predictors of later reading ability and academic success. Although research has established the importance of phonological abilities and vocabulary development in the development of early literacy skills in English-speaking children (Bus & van IJzendoorn, 1999; Gillam & Gorman, 2004; Scarborough, 2001), few studies have examined these skills with the ELL population.

Comparison of phonological norms across languages has suggested that the rates and patterns of phonological development are similar in English and Spanish. Perhaps due to the fact that these languages have many shared phonemes, Spanish-English bilingual children have also been observed to acquire phonetic inventories at approximately the same rate as their monolingual peers. While exposure to two

languages simultaneously may not interfere with phonological development, little is known about how phonological development compares across languages and how phonological skill relates to the development of vocabulary skills in each language.

It has been widely cited that the vocabulary performance of cultural and linguistic minority children is significantly lower than their same age peers when compared to national norms (Champion et al., 2003; FACES, 2003; Páez et al., 2007; Restrepo et al., 2006). Interpreting and measuring the vocabulary knowledge of ELL children is further complicated by the fact that these children often do not have the same words in each language. When given credit for conceptual knowledge across both languages, however, bilingual children demonstrate comparable vocabulary levels to their monolingual peers (Alvarado, 2000; Marchman & Martinez-Sussman, 2002). Still, little is known about how ELL children are developing vocabulary in each of their languages and how knowledge in one language may contribute to the acquisition of new words in the other language. For ELL learners, language development is influenced by the amount of language exposure, age of acquisition of the second language, and frequency of language use (Goldberg, et al., 2008). In the present study, language groups are used to differentiate children with varying amounts of language exposure and use. Here, children will be grouped by language use based on a language profile (created from parent report), which will be used to quantify the amount of language exposure and usage in a variety of home, school, and community environments.

Although research has linked phonological abilities and vocabulary development with early literacy skills in English-speaking children, less is known about this relationship in the ELL population. Given that these phonology and vocabulary skills

develop interdependently and there is evidence that strong skills in one area may predict or transfer to skills in another area (Cárdenas-Hagan et. al., 2007; Durgunoglu, 2002; Lopez & Greenfield, 2004), further investigation into these components of skill development in ELL children is warranted. Therefore, the objective of this study is to explore the relationships between frequency of language use, phonological abilities, and vocabulary in ELL preschoolers. Toward understanding these variables, the following questions are examined:

1. Do phonological performance, as measured by completeness of phonetic inventory (CPI) and proportion of whole word proximity (PWP), and vocabulary skill, as measured by WLPB-R Picture Vocabulary subtest, differ by frequency of language use and across languages?
2. Does phonological skill, as measured by PWP, predict performance on vocabulary measures?
3. Which parent-level variables influence phonological and vocabulary development in ELL children?

Chapter Two

Methods

Participants

A total of 39 children, 20 males and 19 females, were recruited for this research project. Participants for this study were recruited for the pilot phase of the Assessing Bilingual Phonological Development in Young Children (Sounds of English and Spanish) Project being conducted at the University of South Florida (Dr. Lisa Lopez), Penn State University (Drs. Adele Miccio and Carol Hammer), and the University of New Mexico (Dr. Barbara Rodriguez). Upon review of the data collected for this study, it was discovered that digital recordings of one of the phonological measures were missing for three children. Therefore, these three children were removed from the study and none of their data were included in the analyses. Demographic information for the remaining 36 participants included in the study is described below. Participants ranged in age from 3.1 to 5.6 years ($M=4.4$ years). All participants were of Cuban ($n=17$) or Puerto Rican ($n=19$) descent. The ethnicity criterion was established to account for the influence of dialect differences on the phonetic inventory. To meet criteria for ethnicity eligibility, the child had to be born in one of the target countries or the child's mother was from Cuba or Puerto Rico. The nationality of the mother was used as the criteria because studies have shown that the mother's native language has a significant impact on the phonological development of young children (Girolametto et. al., 1999; Huttenlocher, et. al., 1991).

Participants were recruited from seven Head Start sites ($n=34$), one private preschool program ($n=1$), and from an announcement placed in a local newsletter ($n=1$). Demographic data from the central Head Start administrative office was used to identify preschool sites serving Latino families. This office sent a query to each of its sites asking the Center Coordinators to report back the number of Cuban and Puerto Rican children enrolled in their programs. Conclusive recruitment data were not obtained from this process as Head Start information only recorded families as Hispanic and did not specify the families' nationalities. However, Center Coordinators provided the investigators with a list of sites with potential participants based on the staff's knowledge of the families served. An announcement seeking participants was also placed in a newsletter sent to local child care providers. This author visited two sites to speak to parents about the project.

Fliers and consent forms were distributed to the identified sites. Parents were encouraged to review the information provided, sign the consent form if interested in participating, and return the form to their child's Head Start site. Consent forms were collected by Head Start staff who then contacted this author to come and pick up the forms. This author reviewed the collected consent forms to verify participants' eligibility (e.g. child age and ethnicity). Finally, this process was repeated at a private day care center identified by word of mouth as serving a predominantly Latino population. In all, 34 children were recruited from seven Head Start sites, one child was recruited from the private day care center, and one family responded to the announcement placed in the childcare newsletter (this child was assessed in his home). All sites were located in southwest Florida.

A phone interview was conducted with the parents of the children in the study in order to obtain information about each child's language exposure and use at home and in school. Parent report of children's language use has been shown to provide valuable and reliable insight into children's language ability (Marchman & Martínez-Sussmann, 2002; Gutierrez-Clellen & Kreiter, 2003). One study exploring the reliability of parent reports of language input and use at home and school found high correlations between parent estimates of Spanish input and use and grammatical performance in that language (Gutierrez-Clellen & Kreiter, 2003). Another study supporting the validity of parent reports, found that parent rating of children's vocabulary and grammar were significantly correlated to children's performance on standard measures of the same skills (Marchman & Martínez-Sussmann, 2002). For the current study, information collected during a parent interview was used to assign children to one of three groups (predominantly English-speaking, predominantly Spanish-speaking, bilingual) based on their reported amount of language exposure and use. Participant demographics by language group are illustrated in Table 3.

With regard to ethnicity, children were fairly evenly distributed across the predominantly Spanish-speaking (PS) and bilingual (BI) groups, but nearly all of the children in the predominantly English-speaking (PE) group were Puerto Rican. Participants ranged in age from 3.1 to 5.6, with a mean age of 4.4 years. In order to examine the distribution of age by language group, participants were split into two age categories (3 to 4.4 years and 4.5 to 5.6 years). Participants were well distributed by age in the PE and PS groups, with a slightly higher concentration of participants from the older age range in the BI group. Gender was equally represented in the sample as a

whole (18 males, 18 females) and was fairly evenly distributed across each of the language groups.

Table 3. *Participant Demographics by Language Group*

	Predominantly English-speaking (PS, n=10)	Predominantly Spanish-speaking (PE, n=12)	Bilingual (BI, n=14)	Total
Ethnicity				
Cuban	0	10	7	17
PR	10	2	7	19
Age				
3 – 4.4 yrs	4	7	6	17
4.5 – 5.6 yrs	6	5	8	19
Gender				
Male	3	7	8	18
Female	7	5	6	18
Speech/Lang. Hx				
Hearing concerns	0	0	1	1
Speech concerns	1	2	4	7
Lang. concerns	0	5	7	12
Tested	6	4	11	21
Received therapy	2	2	3	7

During the parent interview, information was also obtained on the age at which children were first exposed to English. Parent responses were aligned with children’s designated language group, as would be expected. As such, the majority of PE children were exposed to English from birth while the majority of PS children were exposed to English later after entering school. Not surprisingly, responses for children in the bilingual group showed more variability, but indicated that most of these individuals were exposed to English before starting school and during school. All but one child was exposed to Spanish from birth and this child was in the PE group.

Additional information regarding the child's speech, language, and hearing was obtained from the parent interview. This information was included given its potential impact on phonological development. Among the participants, there were seven parent reports of concern for the child's speech (e.g. pronunciation of words) and eleven reports of concern for the child's language development (e.g. beginning to talk late, having a small vocabulary, difficulty combining words into sentences, making grammatical errors). Twenty participants had been tested by a speech/language pathologist and seven participants had received speech/language pathology (SLP) services at some point. Therefore, the performance of the seven participants who received SLP services was examined both independently and as part of the entire sample. Parents of two children reported having concerns for their child's hearing at some time in the past and in both cases, the concerns were related to a history of ear infections. No incidence of ongoing or permanent hearing loss was reported. Therefore, these two children were included in the sample.

Finally, information on several family-level variables was obtained through the parent interview. This information included the mother's level of education and mother's language ability in English and Spanish. Table 4 illustrates the distribution patterns of the family level variables across the language groups. Parent education levels ranged from 8th grade through a Bachelor's degree. Parent education levels were divided into five categories: 1) less than high school (did not complete high school, $n=10$); 2) high school/GED (received HS or GED diploma, $n=9$); 3) trade school ($n=6$); 4) some college ($n=8$); and 5) AA/BA (completed an Associates or Bachelors degree, $n=5$). Interestingly, when ranked in order of educational attainment, the BI group had the highest number of

participant families with some college or an AA/BA degree, followed by the PE group and then the PS group.

Mother’s language ability was self rated during the interview using a scale of 1 (little or no language ability) to 5 (fluent language ability). For descriptive purposes, group averages were calculated for mother’s language ability. Distributed across participants’ language groups, mother’s English language ability was highest in the PE group (4.6), followed by the BI group (3.25), and was lowest, as might be expected, in the PS group (3.08). Mother’s Spanish ability was high for all groups, with an average of 5.0 in the PS and BI groups and an average of 4.4 in the PE group (see Table 4).

Table 4. *Family Variable Demographics by Language Group*

	Language Group			
	PE	PS	BI	Total
Education Level				
< HS	4	2	2	8
HS/GED	0	6	3	9
Trade school	1	2	3	6
Some college	2	2	4	8
AA / BA	3	0	2	5
Language Ability				
Mother’s English (Group Avg.)	4.6	3.08	3.25	n/a
Mother’s Spanish (Group Avg.)	4.4	5	5	n/a

Materials

Language Measures

The Picture Vocabulary subtest from the *Woodcock Language Proficiency Battery-Revised* (WLPB-R, Woodcock, 1991) measured the child’s ability to name familiar and unfamiliar pictured objects. Although a few receptive items were

administered at the beginning of the test, this was primarily an expressive vocabulary task. The task elicited single-word productions that represented a progression of familiar to unfamiliar vocabulary (Woodcock, 1991). The child received one point for each correct answer and the test was discontinued when the child answered six consecutive items incorrectly. A list of target responses is included in Appendix A.

The Memory for Sentences subtest from the WLPB-R measured the child's ability to remember and repeat phrases and sentences presented. This task required the listener to make use of sentence meaning to aid in recall. Target phrases and sentences were presented auditorily by the examiner. For test items 1 through 5 (single word responses), the child received one point if he/she repeated the item exactly. For the remaining test items (phrases and sentences), the child received two points for repeating the phrase exactly, one point for repeating the phrase with only one error, and zero points for repeating the phrase with two or more errors. Testing was discontinued when the child received a zero score on four consecutive items. A list of target responses is included in Appendix B.

WLPB-R raw scores were converted to standard scores using *Compuscore for the WLPB-R*. *Compuscore* is a microcomputer program that facilitates the scoring process by generating a variety of reports after the raw scores are entered. The program automatically scores the data and produces participant reports in the same format as is done manually using the Test Record and norms tables. As described in the *WLPB-R Examiner's Manual* (Woodcock, 1991, p.124), reliability and validity characteristics of both forms of the WLPB-R meet basic technical requirements for clinical purposes and for research on the language abilities of participants from preschool to the geriatric level.

Phonological Measures

The *Bilingual Phonological Assessment* (BIPA) tool developed for the Sounds of English and Spanish Project (Grant R01 HD051542, funded by NIH-NICHHD, ACF, ED-OSEP/OSERS) was used to measure phonological ability. Pictures were presented one at a time in Microsoft PowerPoint on an IBM ThinkPad X41 tablet PC and children were asked to name each picture. If the child was unable to name the picture spontaneously (Level 1), the examiner elicited a delayed imitation response (Level 2) by offering the child two choices - the correct name and a standard wrong choice. The same wrong choice was used consistently throughout the assessment and for all participants. If the child did not answer correctly at level 2, the examiner elicited a direct imitation response (Level 3) by naming the picture and having the child repeat the word. Examples of each type of prompt are included in the Table 5 below.

Table 5. *BIPA Prompt Levels*

	Noun Target	Verb Target
Level 1 (Spontaneous)	What is this? ¿Qué es esto?	What is he/she doing? ¿Qué está haciendo?
Level 2 (Delayed Imitation)	Is this a _____ or a pickle? ¿Es _____ o pepino?	Is he/she _____ or dancing? ¿Está _____ o bailando?
Level 3 (Direct Imitation)	Say _____. Di _____.	Say _____. Di _____.

During the BIPA assessment, each child was shown 92 pictures in Spanish and 132 pictures in English. The target responses provided opportunities for the child to produce each phoneme in each language a minimum of two times. Word lists for each language are included in Appendices C and D. Reliability and validity characteristics of the BIPA are still being investigated at this time.

Children's responses were recorded on a paper protocol and stored on an Olympus Digital Voice Recorder WS-200S. Digital voice recordings were saved as audio files (.wav) and played for transcription using Windows Media Player. All files were stored on a Western Digital 500 GB External hard drive. Back-up copies of the audio files were burned on Phillips 4.7 GB DVDs.

Procedures

Assessment

All assessments were administered by two graduate students, herein referred to as the "assessors." English assessments were completed by this writer, a graduate student in Speech-Language Pathology and a native Speaker of English. The Spanish assessments were administered by a graduate student in School Psychology who is a native speaker of Spanish and of Cuban descent. The assessors were trained individually on each assessment tool by the BIPA Project Principal Investigator. Initial training on the assessments was conducted in English for both assessors. On the first day of data collection, each assessor observed the Principal Investigator administer an entire assessment in the assessor's assigned language. Following this, the assessor completed an assessment under the supervision of the Principal Investigator. The remaining assessments were completed independently by each assessor. Periodic meetings were held with the assessors and the Principal Investigator to monitor progress and ensure consistency in the assessment process.

Children were assessed at their preschool sites in the mornings between 8:30am and 11:30am, Monday through Friday. Each child was assessed once in English and once in Spanish with at least one week between them to reduce the possibility of a testing

effect due to the child's familiarity with the task. Assessments in each language were also completed within 2-3 weeks of one another to reduce the effect of maturation on children's performance. Each assessor made every effort to speak only the designated language of assessment in the presence of the child to be evaluated.

To facilitate scheduling of assessments, sites were divided between the two examiners based on geographic location of the centers. Since assessments were conducted simultaneously at different sites, the distribution of sites between the two assessors also helped control for order of testing. As such, just over half of the children (21) were assessed first in English, then in Spanish. The remaining children (15) were assessed first in Spanish, then in English.

Each child was assessed individually in a quiet room or hallway at the preschool site. Assessments took approximately 20-25 minutes. Participants' performance on the Picture Vocabulary and Memory for Sentences subtests was scored during the assessment using the Microsoft Windows Journal program on a tablet PC. Each child was then administered the BIPA. Pictures were presented as a slide show using Microsoft PowerPoint on the same tablet PC. Throughout the assessment, assessors used neutral verbal reinforcements (e.g. "Good pointing;" "I like the way you are listening") to motivate the child. All responses for both language subtests and the BIPA assessment were recorded using the digital recorder which was placed on the table in front of the child at the onset of testing. Upon completion of the entire assessment battery, children were allowed to choose two stickers from a book.

Parent Interview

Phone interviews were conducted with the parents of the children in order to obtain background information about the family demographics, the child's educational experiences, the child's language use at home and in school, and other factors related to the development of speech and language. The complete parent interview for the BIPA project included additional family information that was not needed for this particular study. A list of the interview questions used in the present study is included in Appendix E.

Parent interviews began after assessments were completed for all participants. Parent contact information was obtained from the consent forms. Interviews were conducted by phone and lasted approximately 10-15 minutes. All interviews were conducted by the Spanish assessor, a native Spanish-speaking female graduate student. The majority of the interviews were conducted in the evenings, but several were done during the day at the request of the parents. All responses to the interview questions were recorded using Knight Software Survey Participant System 2.1 on an IBM ThinkPad X41 tablet PC at the time of the interview.

After each parent interview was completed, parents were mailed a \$15 Wal-Mart gift card in appreciation for their participation in the BIPA project. Teachers at the preschool sites received a tote bag with the project logo for their role in helping recruit children and allowing assessors to use their space. Administrators who facilitated the process at each site received a mug with the project logo.

Transcription

Digital recordings of the children's productions during the BIPA assessment (single words) and MS subtest (phrases) were transcribed using the International Phonetic Alphabet (International Phonetic Association, 1999). BIPA word transcriptions were completed by two graduate and one undergraduate speech-language pathology students at the Child Phonology Laboratory at The Pennsylvania State University (Penn State). Recordings of words elicited in English were transcribed by a native English speaker and the Spanish word productions were transcribed by bilingual English-Spanish speakers trained in English and Spanish phonetics through formal classes and by the Principal Investigator of the *Sounds of Spanish and English Project* at Penn State. In order to ensure transcription reliability, 10 percent of samples were compared to determine inter-rater reliability. Using weighted transcription (Oller & Ramsdell, 2006), mean inter-rater reliability was .985 for English and .968 for Spanish.

MS recordings were transcribed by two undergraduate students in the Communication Sciences and Disorders program at the University of South Florida (USF). Both students were bilingual English-Spanish speakers and were native Spanish speakers of Puerto Rican and Puerto Rican/Honduran descent. These transcribers had completed the Phonetics course at USF and were trained on this project by this author. The author also transcribed the productions of twenty percent of the sample (8 participants) in each language to establish transcription reliability. Inter-transcriber reliability was demonstrated at .809 in English and .861 in Spanish. Discrepancies between the transcribers were due primarily to the fact that many of the children's productions on the MS subtest were largely unintelligible. The MS subtest required that

children repeat phrases after the assessor. For some of the children, imitating the phrases was a challenge in one language or the other (e.g. some predominantly English speaking children had trouble repeating phrases in Spanish). Therefore, many of the children's responses were unintelligible attempts at imitating the production of the assessor. These productions were transcribed to the degree possible and they account for the vast majority of inter-transcriber discrepancies. Other discrepancies included differences in transcribing distortions of the dark /ɹ/ in the final position of English words (e.g. transcribed as a vowelized /l/ vs. an omission), and differences in transcribing allophones in Spanish (see Chapter 1) such that transcribers either did not perceive the allophonic substitutions or they did not consistently use the appropriate IPA symbols to mark the Spanish allophones.

Data Collection/Reduction

Microsoft Office Excel spreadsheets were created to track participants' demographic information and assessment results. Demographic information included child name, nationality, gender, date of birth, preschool site, classroom, and parent name, address, and telephone number. Assessment data for each language test included date of assessment, raw scores, and standard scores. Raw scores were converted into standard scores using the *Compuscore for WLPB-R* (Woodcock, 1991) software program.

The phonological measures consisted of completeness of phonetic inventory (CPI) in word and phrase contexts and proportion of whole-word proximity (PWP; Ingram, 2002) in each language. CPI was used to examine which specific phonemes children were consistently producing in the word and phrase contexts in each language.

The PWP was chosen in order to measure a child's phonological production accuracy in comparison to an expected adult target.

CPIs were determined by first creating target phonetic inventories for initial and final consonants elicited by both the BIPA (words) and the MS (phrases) stimuli. Individual phonemes that were produced at least twice by the child were counted as part of the child's phonetic inventory. For each word position in each context, a CPI was calculated by dividing the number of phonemes in the child's inventory by the number possible in the target inventory.

In order to determine PWP, a phonological mean length of utterance (PMLU; Ingram & Ingram, 2001) was calculated for each target word and for each child's productions (in both languages). PMLU was determined by counting one point for each phoneme segment and one additional point for each correct consonant. The proportion of these two PMLUs (e.g. the child's PMLU divided by the adult PMLU) determined the PWP score. In an effort to use PWP equitably across languages, and to account for any unique differences when applying PWP to English and Spanish, the following procedures were used when calculating the PMLU. Consonant clusters were counted as two separate segments in both languages. Diphthongs were transcribed as one phoneme (and therefore counted as one segment), with the exception of the rhotic "r" in English. Since many children were observed to vowelize the rhotic "r" in the final position, these segments were transcribed as two phonemes, thereby giving the child credit for marking the segment, but losing credit for not correctly producing the rhotic "r." For example, using this procedure, the word "car" has a target PMLU of five (phoneme segments: c + a + r, and consonants: c + r). Therefore, if a child vowelized or distorted the final "r" (e.g.

deviating from the correct adult target production) this would be reflected in the reduced PWP. Whereas, if –ar were transcribed with one phoneme as would typically be done (thereby setting PMLU at three), the child would receive full PWP credit ($3/3 = 1.0$) even though his production was not one hundred percent correct. Since the Spanish tap /r/ (which does not occur as a diphthong) was frequently in error for these children, thereby lowering their PWPs, counting the rhotic r as two phonemes also helped to establish consistency in using the PWP across languages.

When eliciting the target words in both languages, children frequently named items using an article (e.g. “a cookie” or “una galleta”). Articles, when produced, were not included in the PMLU calculations of the target word. Using the preceding article had no effect on children’s production of words in English. Given the phonological rule of spirantization in Spanish, however, plosive phonemes (/b, d, g,/) were produced as allophonic fricatives in the intervocalic position (e.g. /gajeta/ becomes /una ɣajeta/). Using the feminine article (“una” or “la”) in Spanish created an intervocalic context for the initial phoneme in 6 of the 92 words elicited (boca, galleta, gallina, gato, vela, ventana). When scoring PMLUs, children were given credit for this allophonic substitution when used appropriately.

Finally, data was extracted from the parent interview to create language use profiles for each child. To this end, this author reviewed all of the questions from the interview and identified 18 questions related to language exposure/use by parents, siblings, and caregivers in home and school settings (see Appendix F for a list of the questions). Responses to the 18 items from the parent interview were coded using a one to five scale, as follows: 1) English only; 2) more English than Spanish; 3) equal English

and Spanish; 4) more Spanish than English; 5) Spanish only. Scores for all of the items for each participant were then averaged, generating the child's language use "score." Finally, all scores for the sample were divided into three ranges representing the three categories of language use: 1) predominantly English-speaking (1.5-2.5 average); 2) predominantly Spanish-speaking (3.67-5.0); and 3) Bilingual (2.58-3.4). Therefore, participants in the bilingual group ($n=10$) included children who used approximately equal amounts of Spanish and English when communicating. The predominantly Spanish-speaking group ($n=17$) included participants who, on average, used from "more Spanish than English" to "all Spanish." Predominantly English-speaking participants ($n=12$) received scores ranged from using "more English than Spanish" to "all English."

Data Analysis

Descriptive and inferential analyses were conducted on several child-level and family-level variables in order to answer the research questions proposed by this study. Statistical analysis of child-level variables was performed using phonological data (CPI by word position and PWP) obtained from transcriptions of the participants' productions during the BIPA and the Memory for Sentences subtest in both languages. Analysis was also conducted using the standard scores for the Picture Vocabulary (PV) and Memory for Sentences (MS) subtests of the WLPB-R in both English and Spanish. Analysis of family-level variables included information obtained from the parent interview relating to parent education level, parent language ability, and frequency of language (English vs. Spanish) used by parents and caregivers. Responses to interview questions were coded and used as independent variables in analysis of their relationship to children's performance on the language and phonological measures.

The phonological and vocabulary data were analyzed using five separate 3-way ANOVAs. The independent variables were: gender, language group (predominantly English speaking, predominantly Spanish speaking and bilingual Spanish-English), speech treatment (vs. no speech treatment), and language of assessment (English vs. Spanish). The dependent variables were proportions of phonological accuracy (word CPI and phrase CPI for initial and final position and PWP) and standard scores (from PV and MS subtests) in each language. Post hoc testing was conducted as needed to further analyze significant findings using the Bonferroni procedure. Multiple regression analyses were then conducted to identify potential relationships and to explain the amount of variance that might be accounted for by significant relationships between phonological skill and vocabulary, as well as any relationships between family-level variables (e.g. mother's education level and mother's language ability) and children's performance on the language and articulation measures.

Chapter Three

Results

Descriptive, inferential, and qualitative analyses were used to examine relationships among several variables believed to be related to the development of early literacy skills in preschool children who are ELL. The variables examined in this study were frequency of language use, phonological skill, vocabulary knowledge, mother's education level, and mother's language ability. Child-level variables included standard scores for the Picture Vocabulary (PV) and Memory for Sentences (MS) subtests of the WLPB-R in both English and Spanish, along with phonological data obtained from transcriptions of the participants' productions during the BIPA and the Memory for Sentences subtest in both languages. The phonological measures were completeness of phonetic inventory (CPI) in each language for each speech sample and proportion of whole-word proximity (PWP). Family-level variables derived from the parent interview included parent education level, parent language ability, and frequency of language (English vs. Spanish) used by parents and caregivers. Specifically, analyses were conducted to answer the three research questions posed by this study:

1. Do phonological performance, as measured by completeness of phonetic inventory (CPI) and proportion of whole word proximity (PWP), and vocabulary skill, as measured by WLPB-R Picture Vocabulary subtest, differ by language use and across languages?

2. Does phonological skill, as measured by PWP, predict performance on vocabulary measures?
3. Which family-level variables influence phonological and vocabulary development in ELL children?

Differences in Performance Within and Across Languages

Descriptive Analyses

Analyses of child-level variables were performed using standard scores for the Picture Vocabulary (PV) and Memory for Sentences (MS) subtests of the WLPB-R in both English and Spanish. Phonological data included proportions of accuracy (CPI and PWP) obtained from transcriptions of the participants' productions during the BIPA (word CPI) and the MS subtest (phrase CPI) in both languages. Table 6 illustrates means and standard deviations for each independent variable for the entire sample and by language group.

Inferential Analyses

The phonological and vocabulary data were analyzed using five separate 3-way ANOVAs. The independent variables were: gender, frequency of language use (predominantly English speaking, predominantly Spanish speaking and bilingual Spanish-English), speech treatment (vs. no speech treatment), and language of assessment (English vs. Spanish). The dependent variables were word CPI and phrase CPI (for initial and final position), proportions of phonological accuracy (PWP), and standard scores (from PV and MS subtests) in each language. Family-level variables (mother's education level and mother's language ability) were examined as possible

predictor variables in relation to children’s performance on the articulation and language measures.

Table 6. *Descriptive Statistics of Phonological Skills and Language Skills by Language Group*

	Total	PE	PS	BI
Phonological Skills	Mean (<i>SD</i>)			
Eng Word Initial CPI	.847 (.086)	.886 (.075)	.818 (.070)	.844 (.099)
Span Word Initial CPI	.840 (.106)	.875 (.059)	.854 (.067)	.844 (.106)
Eng Word Final CPI	.797 (.157)	.800 (.031)	.794 (.160)	.636 (.171)
Span Word Final CPI	.579 (.105)	.921 (.048)	.835 (.140)	.837 (.122)
Eng Phrase Initial CPI	.827 (.134)	.869 (.102)	.823 (.122)	.799 (.162)
Span Phrase Initial CPI	.676 (.117)	.841 (.177)	.794 (.114)	.675 (.117)
Eng Phrase Final CPI	.720 (.095)	.722 (.121)	.734 (.106)	.709 (.067)
Span Phrase Final CPI	.669 (.197)	.742 (.206)	.608 (.112)	.664 (.234)
Eng PWP	.890 (.078)	.944 (.035)	.871 (.068)	.869 (.091)
Span PWP	.876 (.049)	.879 (.028)	.886 (.033)	.864 (.069)
Language Skills				
Eng PV	73.72 (19.93)	88.00 (12.94)	64.50 (21.18)	71.43 (18.25)
Span PV	56.00 (15.77)	40.30 (12.38)	64.08 (10.26)	60.29 (14.31)
Eng MS	68.50 (27.23)	84.90 (13.13)	54.58 (29.54)	68.71 (27.43)
Span MS	69.64 (11.40)	59.61 (7.14)	72.08 (17.59)	69.64 (11.40)

Phonological measures (CPI). Phonological skill was measured in part by completeness of phonetic inventory (CPI). Data on CPI was collected for consonant production in the initial and final positions of words (BIPA) and phrases (MS) in each language. Table 7 outlines the target inventories by word position in each context in each language. Word CPI data came from the BIPA assessment in which the same word

stimuli in each language were elicited from every child. Therefore, the word target inventories were the same for all children in the sample. Data on phrase CPI, however, were obtained from the children’s performance on the MS subtest. Pursuant to the ceiling rules for that subtest, the assessment was discontinued when a child received a score of zero (e.g. had more than two errors recalling the target phrase) on four consecutive items. As such, the phrase sample sizes were different for each child (see Table 7). Since performances on the MS in English and Spanish were so variable, the number of target phonemes possible was different for each child. This variability could work in some children’s favor by saying that they got one phoneme correct when only one phoneme production was possible (e.g. CPI=100%) or it is possible that they got one phoneme correct out of a possible five targets (e.g. CPI=25%). Hence, the frequency counts may not present an accurate picture of CPI for each child. Therefore, the phonological data for MS (e.g. phrase CPI) in English and Spanish will be discussed qualitatively as it supports the phonological findings. Findings for word CPI data are discussed below for word initial and word final inventories.

Table 7. *Total Number of Consonants in Target Inventories for BIPA and MS Samples*

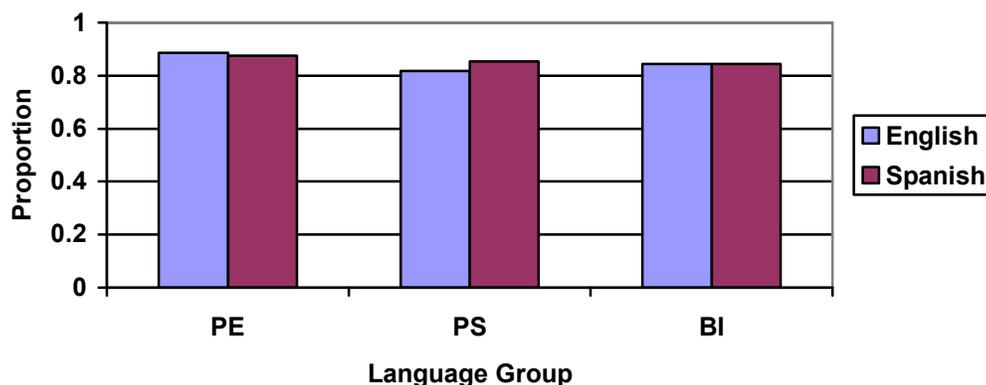
	BIPA English	BIPA Spanish	MS English	MS Spanish
Initial Consonants	22	16	6 to 15	5 to 11
Final Consonants	16	5	5 to 13	1 to 4

In general, word initial CPIs for all groups in both languages were fairly high (range = .836 - .876), suggesting that some phonemes in each language were still developing. For all subjects combined, the mean CPIs across languages were very

similar, but were slightly higher in Spanish (mean = .853) than in English (mean = .843). Although this difference was not significant, this observation may be related to the nature of the phonemes in each language; Spanish appears to have more early developing phonemes than English (Jimenez, 1987; Smit et. al., 1990).

In order to determine if language group, language used, or gender had an effect on the child’s word initial phonetic inventory, a three-way ANOVA was computed. This analysis only revealed a significant main effect for gender, $F(1,30) = 6.105, p < .05, \eta^2 = .169$. Girls tended to have higher CPIs than the boys (CPI = 0.88 vs. 0.82). No other interactions or main effects were significant. As seen in Figure 2, analysis of the differences in word CPIs were not significant for any of the language groups or across languages, $F(2,30) = 1.047, p = .364, \eta^2 = .065$. This finding would suggest that these children are developing at approximately the same rate in both languages or that these two languages share many of the same early developing phonemes.

Figure 2. *Word Initial Completeness of Phonetic Inventory Between Language Groups in English and Spanish*

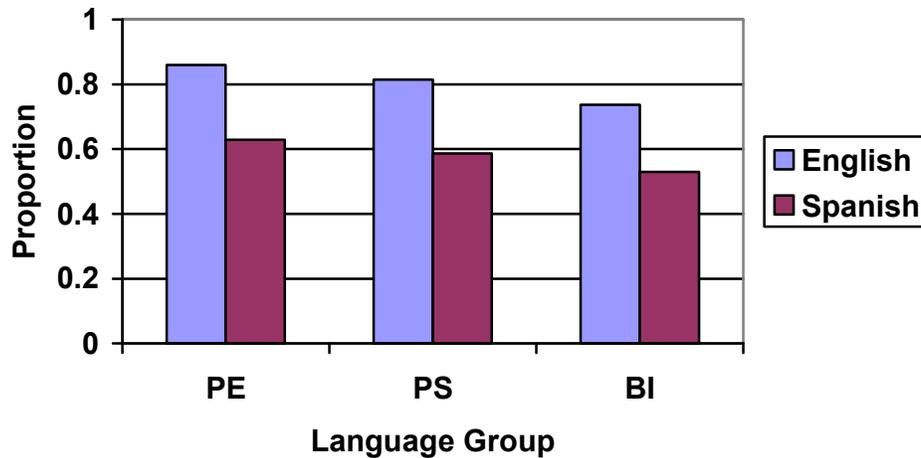


Word final CPIs across groups were lower in Spanish (mean = .58) than in English (mean = .80). The low Spanish average may be due to the fact that there were

only five consonants tested in the final position. Nearly all of the children missed two of the five consonants (/d, r/) and no child produced the final /d/, thereby lowering that group's average. It should be noted, however, that the final /d/ only occurred in two of the Spanish stimuli words (pared – “wall”, ciudad – “city”). There are two explanations for the low occurrence of /d/ and /r/ in the final position. First, this finding may represent variation in production related to dialectal differences. Specifically, the omission of final segments is a known characteristic of “radical dialects” of Spanish, such as those spoken in Puerto Rico (Goldstein, 2007, p. 94) and other parts of the Caribbean (Bradley, 2006). It should also be noted that the words containing these phonemes in the final position may not be frequently used by children; given their lack of familiarity with these words, children may be more prone to production errors.

Statistical analyses were conducted to identify significant relationships between word final phonological skill, gender, and language group. A three-way repeated ANOVA revealed a significant main effect for word final CPI, $F(1,30) = 61.0, p < 0.001, \eta^2 = .67$. More final consonants were produced in English than in Spanish. In addition, there was a significant main effect for gender, $F(1,30) = 6.51, p = 0.016, \eta^2 = .18$ and language group, $F(1,30) = 4.83, p = 0.015, \eta^2 = .244$. None of the interactions were significant. In terms of gender, girls were more likely than boys to produce final consonants. Post hoc testing for the language group with the Bonferroni procedure indicated that the predominantly English speaking group produced significantly more final consonants than the bilingual group ($p < .01$). The predominantly Spanish speaking group was not significantly different in final consonant production than either the English speaking or the bilingual group. These findings are illustrated in Figure 3.

Figure 3. *Word Final Completeness of Phonetic Inventory Between Language Groups in English and Spanish*



Qualitative discussion of word and phrase CPIs. A summary of the children's word initial phonetic inventories in English and Spanish is illustrated in Table 8. There were 22 possible target phonemes occurring at least two times each in the initial position of the English word stimuli. Of these, 11 phonemes were found in all of the children's phonetic inventories. An additional seven phonemes occurred in more than 75% of the children's inventories. The voiced and voiceless *-th* phonemes were the least frequently appearing phonemes in 15% and 38% of the group's English inventories, respectively. Comparatively, there were a total of 16 possible target phonemes occurring at least two times in the Spanish stimulus words. Of these, 14 phonemes were produced consistently by more than 75% of the children, and nine phonemes were produced by more than 90% of the sample. Two phonemes, /r/ and /ɲ/, were particularly challenging for this group and were found in only 17% and 24% of the children's phonetic inventories, respectively. CPI data for the phonemes common to both languages was very similar across languages.

In fact, shared phonemes appeared in children’s phonetic inventories in nearly identical proportions in both languages.

Table 8. *Word Initial Completeness of Phonetic Inventory (CPI) in English and Spanish*

English				Spanish			
Phoneme	# of opps. to be produced	# of kids with phoneme in inventory	% of kids with phoneme in inventory	Phoneme	# of opps. to be produced	# of kids with phoneme in inventory	% of kids with phoneme in inventory
/ð/	3	5/34	15%				
/θ/	3	13/34	38%				
/ɹ/	5	23/36	64%				
/v/	3	24/36	67%				
/z/	3	27/36	75%				
/tʃ/	3	29/36	81%	/ tʃ/	3	28/36	78%
/l/	3	33/36	92%	/l/	4	34/36	94%
/n/	2	33/36	92%	/n/		36/36	100%
/g/	5	34/36	94%	/g/	3	34/36	94%
/dʒ/	5	34/36	94%				
/s/	9	35/36	97%	/s/	8	35/36	97%
				/r/	4	6/36	17%
				/ɲ/	4	15/36	42%
				/x/	2	28/36	78%
/b, p, m, f, d, t, k, j/	≥ 3	36/36	100%	/b, p, m, f, d, t, k, j/	≥ 3	36/36	100%
/w, h, ʃ/	≥ 3	36/36	100%				

Word final phonetic inventories in English are illustrated in Table 9. There were 18 phonemes occurring at least twice in final position of the English words. Of those, 10 phonemes were found in the inventories of greater than 90% of the children. In Spanish, there were only five possible target phonemes occurring at least two times in the final position. Of these, three phonemes (/n, l, s/) were found in the inventories of the majority of the children (>89%). None of the children produced a final /d/ and only 11% of the sample produced the /r/ in the final position. It should be noted, however, that omission

of these phonemes in the final position may be dialectal and is characteristic of radical dialects of Spanish spoken in the Caribbean (Bradley, 2006; Goldstein, 2007).

Table 9. *Word Final Completeness of Phonetic Inventory (CPI) in English and Spanish*

English				Spanish			
Phoneme	# of opps. to be produced	# of kids with phoneme in inventory	% of kids with phoneme in inventory	Phoneme	# of opps. to be produced	# of kids with phoneme in inventory	% of kids with phoneme in inventory
/v/	2	15/36	42%				
/θ/	3	15/36	42%				
/b/	2	19/36	53%				
/tʃ/	2	24/36	67%				
/j/	2	28/36	78%				
/z/	6	30/36	83%				
/d/	3	31/36	86%	/d/	2	0/36	0
/g/	5	31/36	86%				
/t/	5	33/36	92%				
/s/	6	34/36	94%	/s/	10	32/36	89%
/k/	5	35/36	97%				
/m/	4	35/36	97%				
/n/	6	36/36	100%	/n/	4	32/36	89%
/l/	6	36/36	100%	/l/	3	34/36	94%
				/r/	4	4/36	11%
/p, w, f, k/	≥3	36/36	100%				

Analyzing data from phrase CPIs was more complicated given that each participant had a different target phonetic inventory based on the level reached on the MS subtest. Table 10 illustrates the phrase initial CPI findings as they occurred for children who had the opportunity to produce the phonemes during administration of the MS in each language. In English, there were 13 possible target phonemes, half of which appeared in the inventories of greater than 90% of those participants. In Spanish, there were ten possible targets, but only two of these were found in more than 90% of children's phrase initial CPIs. Therefore, phrase initial CPI findings are likely more

related to the number of opportunities children had to produce the phonemes rather than a true representation of phonological skill.

Table 10. *Phrase Initial Completeness of Phonetic Inventory (CPI) in English and Spanish*

English				Spanish			
Phoneme	# of kids whose sample included this phoneme	# of those kids with phoneme in inventory	% of kids using phoneme in running speech	Phoneme	# of kids whose sample included this phoneme	# of those kids with phoneme in inventory	% of kids using phoneme in running speech
/ð/	28	6	21%	/ð/	14	0	0%
/l/	16	10	63%	/l/	36	28	78%
/w/	23	16	70%				
/ɹ/	16	12	75%				
/s/	19	15	79%	/s/	36	17	47%
/m/	35	31	89%	/m/	36	35	97%
/k/	35	32	91%	/k/	36	30	83%
/t/	22	20	91%				
/f/	26	24	92%				
/g/	35	34	97%				
/b/	35	35	100%	/b/	10	6	60%
/h/	35	35	100%				
/d/	35	35	100%	/d/	28	17	61%
				/β/	2	0	0%
				/n/	26	18	69%
				/p/	36	35	97%

Phrase final CPI data is illustrated in Table 11. In English, 11 possible phonemes occurred in the final phrase targets. The percentages of inclusion of these phonemes in children's final consonant inventories were much lower in phrases than in single words (range= 0 - 88%). There were only four different target phonemes occurring at least two times in the final position of the Spanish stimulus phrases. Of these, the greatest percentage of children produced /n/ in the final position in phrases (78%), followed by /s/ (75%), and finally /l/ (25%). Only one child had the opportunity to produce /d/ in the

final position, and he did not do so. Once again, the small number of phonemes in the final position of Spanish words as well as the disproportionate number of children who included those phonemes in their speech samples, should be considered. For example, /s/ was produced by six of eight children (75%), whereas /l/ was produced by six out of a possible 24 children, resulting in a much lower percentage of occurrence (25%).

Therefore, no statistical analyses were conducted with the phrase level data.

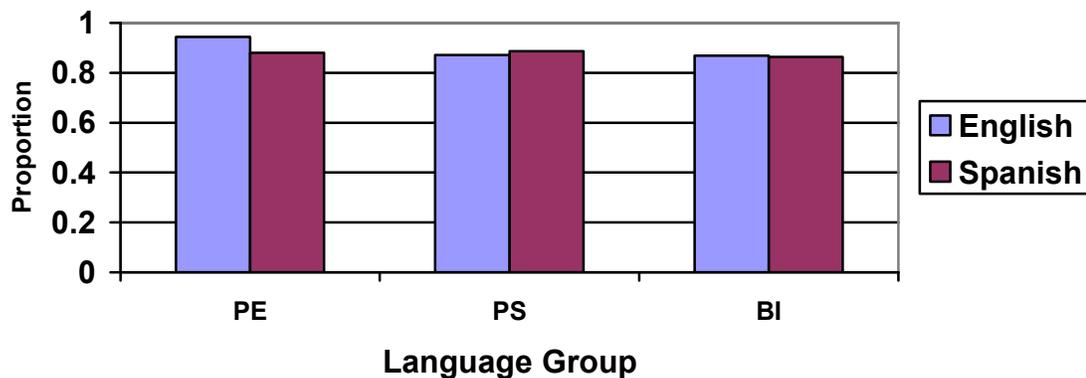
Table 11. *Phrase Final Completeness of Phonetic Inventory (CPI) in English and Spanish*

Phoneme	English			Spanish		
	<i># of kids whose sample included this phoneme</i>	<i># of those kids with phoneme in inventory</i>	<i>% of kids using phoneme in running speech</i>	<i># of kids whose sample included this phoneme</i>	<i># of those kids with phoneme in inventory</i>	<i>% of kids using phoneme in running speech</i>
/ð/	18	0	0%			
/ŋ/	5	0	0%			
/v/	18	1	6%			
/g/	35	17	49%			
/d/	35	24	69%	1	0	0%
/t/	26	18	69%			
/l/	34	26	76%	24	6	25%
/z/	21	16	76%			
/m/	18	14	78%			
/s/	35	29	83%	8	6	75%
/n/	34	30	88%	36	28	78%

Phonological measures (PWP). Phonological skill also was measured by proportion of whole word proximity (PWP). In general, PWPs for all groups in both languages were high (range = .870 - .903). For all subjects combined, the mean PWPs across languages were very similar, but were slightly higher in English (.891) than in Spanish (.876). Statistical analyses were conducted to identify any significant

relationships within and across languages. A three-way ANOVA revealed only a significant interaction between PWP and language group, $F(2,30) = 5.454, p < .05, \eta^2 = .267$. No other interactions or main effects were significant. As illustrated in Figure 4, post hoc testing with the Bonferroni procedure indicated that only one pairwise comparison was significant ($p < 0.05$). The predominantly English-speaking (PE) group had a significantly higher PWP in English than in Spanish. For the PS group, the mean Spanish PWP was higher than the mean English PWP, but this difference was not statistically significant. Although the PS group had a higher mean PWP in Spanish than did the BI group, this difference was also not statistically significant. The BI group had nearly identical PWPs in both languages.

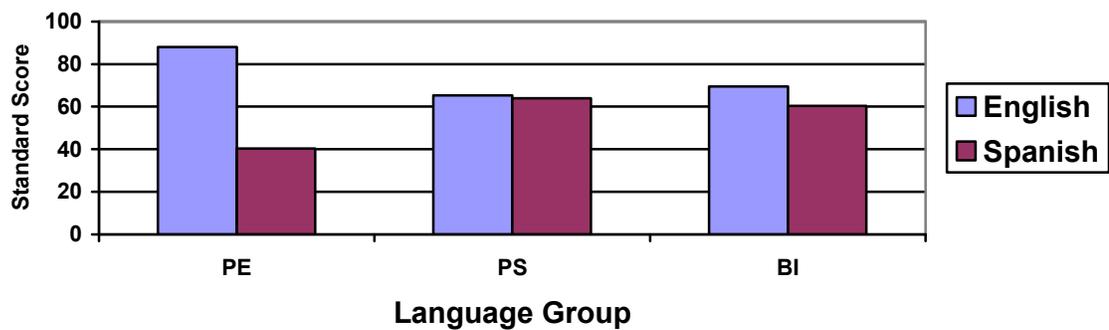
Figure 4. *Proportion of Whole Word Proximity (PWP) by Language Group in English and Spanish*



Language measures (PV): Language skill was measured using the Picture Vocabulary (PV) subtest. In general, PV standard scores for all groups in both languages were low. With the exception of the PE group's English vocabulary ($M=88$), the other groups' performance fell more than one standard deviation below the mean ($M=100, SD=15$) in both languages. For all subjects combined, the mean performance was

significantly higher in English ($M=74.3$) than in Spanish ($M=54.89$). Statistical analyses were then calculated to identify significant differences within and across languages. A three-way ANOVA revealed a significant interaction between PV and language group, $F(2,30) = 10.957, p < .001, \eta^2 = .422$, and a significant main effect for PV, $F(1,30) = 23.783, p < .001, \eta^2 = .422$. Post hoc testing for the interaction with the Bonferroni procedure revealed that eight of the nine pairwise comparisons were significant ($p < .05$). As illustrated in Figure 5, all groups performed significantly different from each other on the measure of vocabulary, both within and across languages. The only exception was that individuals in the predominantly Spanish speaking group performed similarly in both English and Spanish.

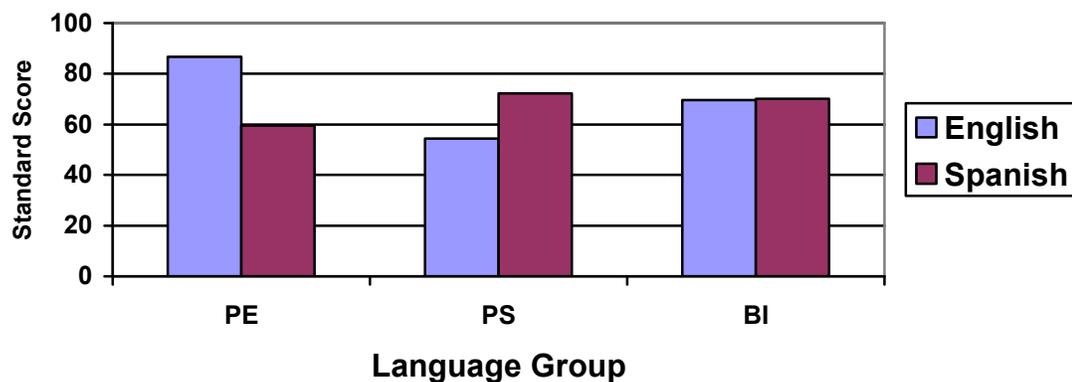
Figure 5. *Picture Vocabulary (PV) Performance by Language Group in English and Spanish*



Language measures (MS). Language skill was also measured using the Memory for Sentences (MS) subtest. MS standard scores for all groups in both languages were generally low. Except for the PE group, whose English scores fell just within one standard deviation of the mean ($M=100, SD=15$) for this subtest, all other groups scored more than two standard deviations below the mean in both languages.

Statistical analyses were calculated to identify significant differences within and across languages. A three-way ANOVA only revealed a significant interaction between MS and language group, $F(2,30) = 6.771, p = .004, \eta^2 = .311$. No other interactions or main effects were significant. As illustrated in Figure 6, post hoc testing with the Bonferroni procedure revealed that seven of the nine pairwise comparisons were significant. All groups were significantly different from one another, both within and across languages, with two exceptions. Individuals in the predominantly Spanish speaking group performed similarly to individuals in the bilingual group in the Spanish condition. Performance of participants in the bilingual group was similar in both English and Spanish.

Figure 6. *Performance on Memory for Sentences (MS) Subtest by Language Group in English and Spanish*



Statistical analyses using ANOVAs were also conducted to determine if performance on experimental tasks differed among children who were reported to have received speech/language therapy and children who received no such treatment. To accomplish this, speech/language treatment was run as an independent variable in the statistical analyses for all articulation and language measures. The interaction between

speech/language treatment and each of the dependent variables was then examined. With regard to performance in phonological skill, no significant differences were found between treatment groups for word initial CPI, $F(1,30) = 0.447, p = .509, \eta^2 = 0.015$, word final CPI for the available participants, $F(1,23) = .127, p = 0.724, \eta^2 = 0.004$, or for PWP, $F(1,30) = 2.583; p = .118, \eta^2 = .079$ (see Figure 7). Likewise for the language tasks, no significant differences were seen for treatment groups for the vocabulary measure, $F(1,30) = 0.314; p = 0.579, \eta^2 = 0.05$, or the Memory for Sentences subtest, $F(1,30) = 0.467; p = 0.50, \eta^2 = 0.015$ (see Figure 8). Otherwise, the findings of these analyses support the previously reported statistical findings.

Figure 7. *Word Completeness of Phonetic Inventory (CPI) and Proportion of Whole Word Proximity (PWP) in English and Spanish by Speech/Language Treatment Group*

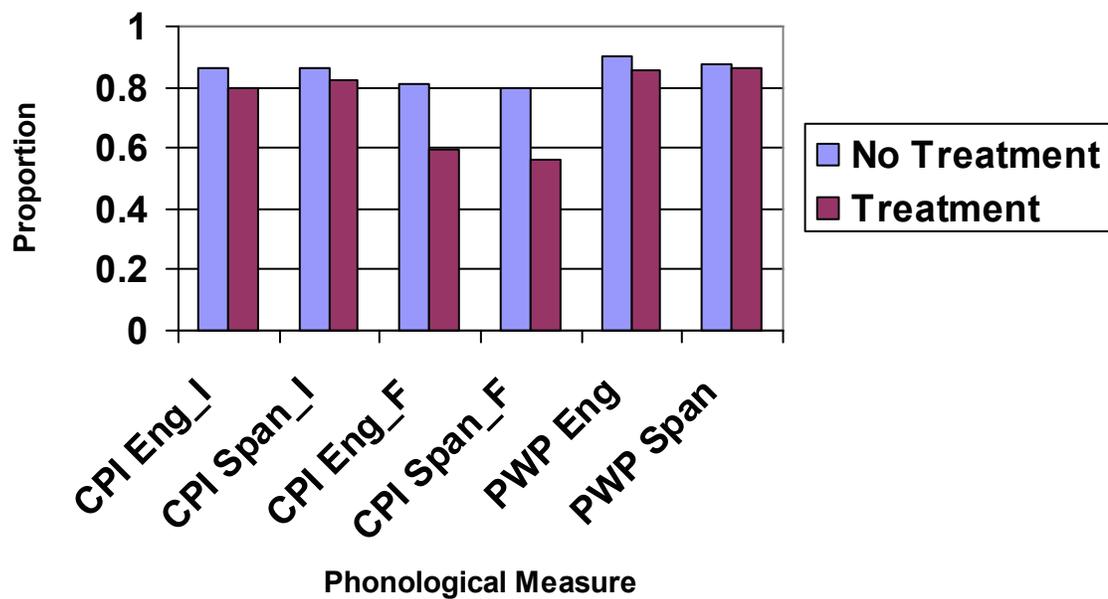
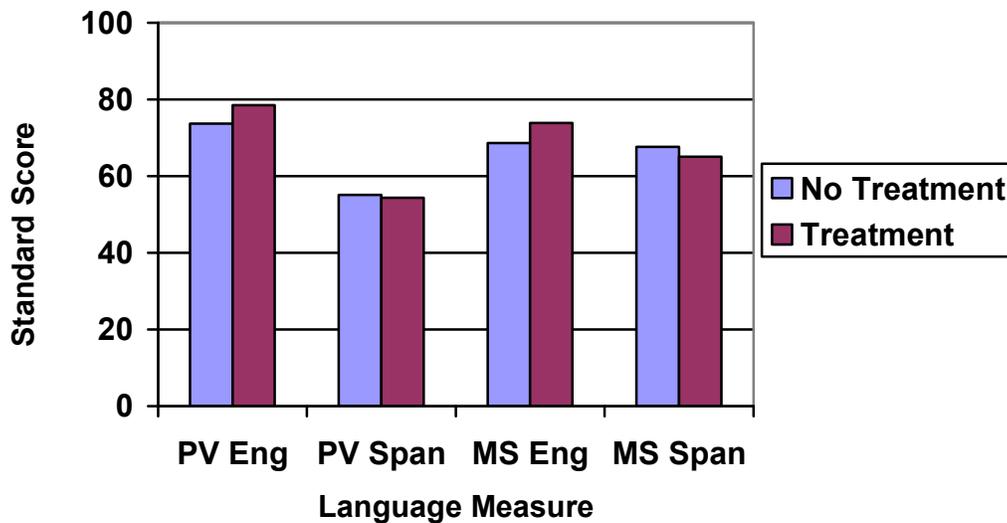


Figure 8. *Performance on Picture Vocabulary (PV) and Memory for Sentences (MS) subtests in English and Spanish by Speech/Language Treatment Group*



Phonology and Vocabulary Interactions (Question 2)

Regression Analysis

Multiple regression analysis indicated that English phonological skill (PWP) was a strong predictor of English vocabulary scores for the PS group, $\Delta R^2=.445$; $p< .05$, and the BI group, $\Delta R^2=.354$; $p< .05$. English phonological skill was not found to be a significant predictor of English vocabulary performance for the PE group. This finding suggests that phonological skill predicts vocabulary ability in the earlier stages of dual language development, but this relationship may lose its effect when phonological skills in the second language are more fully developed, as may be the case for the PE children.

A second regression analysis was then used to explore the existence of potential causal relationships in the opposite direction. When examining the influence of vocabulary skill on phonological development, several interesting findings were noted. Multiple regression analyses indicated that vocabulary skill level in English was a strong

predictor of English phonological skill for both the PS group, $\Delta R^2=.445$, $p < .05$, and the BI group, $\Delta R^2=.354$, $p < .05$. For the PS group only, an inverse predictive relationship was also noted. Spanish phonological skill was found to be negatively correlated with English vocabulary development, $\Delta R^2=.294$, $p < .05$. This finding suggests that children with stronger Spanish language skills are likely those children who have had more exposure to Spanish than English and are therefore likely to have lower English phonological skills. Regression analyses revealed no significant findings related to the predictability of vocabulary skill on phonological skill in either language for the PE group.

Family-Level Variables (Question 3)

Correlational analyses were conducted to examine potential relationships among family-level variables and children's performance, as stated in the final research question. Data on these variables were derived from the parent interview and included information on mother's educational level and mother's spoken language ability in each language. Responses from parent interviews were coded by the five levels of educational attainment described in the methods section (see Chapter 2). This analysis revealed no significant relationships between mother's education level and children's performance on any of the assessment tasks.

Analyses did, however, reveal several interesting findings related to the relationship between mother's language ability and children's vocabulary skill in both languages. Multiple regression analysis indicated a significant predictive relationship between mother's Spanish language ability and child's Spanish vocabulary skill, with this family variable accounting for 20% of the variance ($p < .01$). Although a predictive

relationship did not exist in English, correlational analysis did reveal a moderate significant relationship, $r = .497$, $p < .01$, $r^2 = .247$, between mother's English ability and English vocabulary.

Correlational analyses also revealed small to moderate significant inverse relationship between mother's ability in a particular language and the child's vocabulary performance in the opposite language. This finding was noted in both languages. In other words, mother's English ability was found to be negatively correlated with Spanish vocabulary performance, $r = -0.404$, $p < .05$, $r^2 = .163$. Likewise, mother's ability to speak Spanish was inversely related to English vocabulary development, $r = -0.371$, $p < .05$, $r^2 = .138$. This finding suggests that children demonstrated lower vocabulary performance in a language when the mother had stronger language skills in the opposite language.

Multiple regression analyses were also conducted to examine the relationship between mother's language ability and phonological skill. Disparate findings were noted suggesting that the same relationships did not exist in each language. Analysis of the entire sample indicated a significant predictive relationship between mother's English ability and child's English phonological skill, accounting for 14% of the variance. Analysis did not indicate a similar significant relationship in Spanish.

Summary of Findings

Phonological skill, as measured by CPI, was fairly high suggesting that children were able to produce most of the phonemes in the target language, but that some phonemes in each language were still emerging. No significant differences in CPI between English and Spanish were seen for any of the language groups. This finding suggests that children are either developing phonological skills at approximately the same

rate in both languages and/or that the two languages share many of the same phonemes. A gender effect was noted for CPI with girls demonstrating slightly more complete phonetic inventories for both initial and final consonants in single words.

Word CPI data suggests that there were similarities in patterns of phonological skill across languages. Similar phonemes appeared in children's phonetic inventories, and in similar proportions, in both initial and final word positions in each language. Final consonant CPIs in running speech (phrases) were significantly lower in Spanish than English and this is likely due to the small number of final target consonants in the Spanish phrase final stimuli.

Phonological skill, as measured by proportion of whole-word proximity (PWP), appeared to be related to amount of language exposure and use, especially in English. PE children demonstrated greater phonological skill in English than did PS children. Children in the BI group had nearly identical PWPs in both languages. Interestingly, these scores were relatively high indicating that the children were quite intelligible in both languages. Both measures of phonological skill were correlated with vocabulary performance in English, but not in Spanish. Furthermore, English PWP was found to be a strong predictor of English vocabulary for the PS and BI groups. A predictive relationship between CPI and vocabulary, however, was not found.

Vocabulary performance also differed by language group and across languages. In English, this difference was only significant between the PE and PS groups. In Spanish, the difference was significant between the PE and PS groups, and between the PE and BI groups. No significant difference in vocabulary performance was seen between the PS and BI groups in either language. Overall, vocabulary performance was

significantly low in both languages for all groups and Spanish vocabulary was significantly lower than English vocabulary. In English, vocabulary level was more than one standard deviation below the mean for all groups except the PE group which fell just within one standard deviation below the mean.

No relationship was found between mother's education level and children's performance on any of the measures. Mother's English ability was found to be a strong predictor of English phonological skill, accounting for 28% of the variance. Mother's Spanish language ability did not predict phonological skill, but mother's Spanish ability was found to be a significant predictor of child's Spanish vocabulary. Finally, children who had received speech/language therapy in the past demonstrated no significant differences in performance on any of the measures when compared to children who had received no treatment.

Chapter Four

Discussion

The present study examined several variables related to the development of early language and literacy skills among 36 Cuban and Puerto Rican English language learning (ELL) preschoolers, ages 3.1 to 5.6 years. Specifically, the purpose of this study was to explore the relationships among frequency of language use, phonological skill, and vocabulary development in this group of ELL children. Family-level variables, including mother's education level and mother's language ability, were also examined in relation to the children's development of phonological and vocabulary skills.

Descriptive and qualitative analyses were conducted to examine the differences in children's phonological and vocabulary skills by frequency of language use group. Three-way ANOVAs were used to investigate the relationships between four independent variables (gender, frequency of language use, language of assessment (English vs. Spanish), and speech treatment) and children's performance on articulation (completeness of phonetic inventory (CPI) and proportion of whole-word proximity (PWP)) and language measures (Picture Vocabulary (PV) and Memory for Sentences (MS) subtests of the WLPB-R). Regression and correlation analyses were conducted to identify potential relationships among variables. Results for each research question are discussed below. The results for question one are discussed in two parts; findings related to performance on phonological skills are discussed first, followed by findings related to vocabulary skills.

Phonological Skills

Phonological skills were examined using two measures: completeness of phonetic inventory (CPI) and proportion of whole-word proximity (PWP). CPI was used to identify which phonemes were mastered and consistently produced (e.g., part of one's phonetic inventory) by children in the sample. PWP was used to examine how children were using their phonemes (e.g. production accuracy) at the word level.

Completeness of Phonetic Inventory (CPI)

Phonetic inventories for initial consonants were fairly complete in English and Spanish; however, some phonemes were still developing in each language. As would be expected, all early-developing phonemes in each language were mastered by the majority (>92%) of the children. The phonemes most frequently missing from inventories were /θ, ð, ʌ, v/ in English and /r, ɲ/ in Spanish. This finding is consistent with the developmental norms for this age group (Jimenez, 1987; Smit, et al., 1990), with the exception that /r/ was mastered by age five in the Jimenez study and was only found in 17% of inventories in the present study. The low occurrence of /r/ in this sample may be a result of the interference of the English /ʌ/. In other words, these ELL children may still be negotiating differences in the production of the *r* across languages. An analysis of children's individual inventories for one-third of the sample suggested that the majority of these children (10 of 12) did not produced either /ʌ/ or /r/. For the other two children, /r/ emerged first, which is also consistent with norms, since the English /ʌ/ is the later developing of the two phonemes.

Phonetic inventories across languages were also very similar, which may be related to the fact that there are many shared phonemes between the two languages

(Goldstein et al., 2004). In fact, all of the shared phonemes occurred in nearly identical proportions across languages in the phonetic inventories of these children. On average, CPIs were slightly higher in Spanish than English, but this difference was not statistically significant across frequency of language use groups or across languages. The fact that children in the PE, PS, and BI groups had very similar initial consonant inventories provides further evidence that the existence of multiple shared phonemes may help children employ phonological skills across languages. The differences between phonetic inventories that were apparent involved phonemes that were not shared between the two languages. This finding suggests that children with incomplete inventories are still learning some of the phonemes that are unique to the second language. In other words, the phonemes that are not found in their native language are taking longer to master than those common to both languages.

In addition to differences in the acquisition of unshared phonemes, phonetic inventories also differed by gender. Specifically, the girls in this study had phonetic inventories that were significantly more complete than boys in both the initial and final word positions. This finding is consistent with other research citing that girls performed better than boys on measures of language and production abilities (Berglund et. al., 2005; Bornstein et al., 1998; Locke et al., 2002). Therefore, while phonetic inventories were quite similar across language groups and between languages, gender and the delayed acquisition of unshared phonemes did account for some individual differences in the production of initial and final consonants for the ELL children in this study.

Proportion of Whole-word Proximity (PWP)

Use of PWP to measure production accuracy in both English and Spanish required minor adaptations to the described calculation of PMLU (see Chapter 2). It should be noted, however, that modifications were made when calculating PWP both in English (e.g. adapting the measure to capture distortions of the rhotic diphthong) and in Spanish (e.g. allowing for the process of spirantization when children correctly replaced plosives with fricative allophones in the intervocalic position). Since the necessary modifications were applied consistently to all words for all children, the present study found the PWP to be an adequate approach to measuring phonological skills in terms of whole-word production accuracy in both English and Spanish.

It has also been suggested that PWP may be affected by cross-language differences in word length (Saaristo-Helin, et al., 2006). These researchers noted that having more multisyllabic words in languages like Finnish (and Spanish) would mean that the target PMLUs would be greater in the second language when compared to English. While PMLUs were slightly higher in Spanish ($M=7.75$) than English ($M=6.70$) in the present study, the cross-language difference was smaller than the 2.5-point Finnish-English disparity cited by Saaristo-Helin and colleagues (2006). It should also be noted that these researchers' findings came from a sample of much younger children (11-22 and 14-24 months) than the ELL preschoolers studied here. Despite potential word length differences, however, the present findings suggest that any differences were washed out when calculating the proportion (e.g. child PMLU divided by target PMLU) used for the PWP measure. Specifically, proportions of production accuracy were very similar in

both languages (Eng PWP=.88; Span PWP=.85), suggesting that PWP was not greatly influenced by any cross-language differences in word length.

For all groups, phonological skills, as measured by proportion PWP, were well developed in both languages. On average, English PWPs were higher than Spanish PWPs. The cross-language difference in PWP was only statistically significant for the children with the greatest frequency of English use (i.e. the PE group). Since the predominantly-English speaking children had significantly better phonological skills in English than Spanish, it appeared that greater exposure to and use of English resulted in greater phonological production accuracy in English. In other words, as a result of the increased exposure to English, it is likely that the PE children have acquired more of the unshared English phonemes than the children in the other two language groups, giving them a significantly higher PWP in English than Spanish. The PS and BI children, however, demonstrated similar phonologic performance in both languages. This finding is important for several reasons. First, the PS group did not have stronger phonological skills in Spanish than English, as would be expected. This finding is not consistent with research suggesting that language skills improve with greater amounts of language exposure and usage (Cenoz, 2003; Goldberg, et al., 2008). One explanation for the similar PWPs across languages for the BI and PS groups is that the majority of the early-developing phonemes are common to both languages (Jimenez, 1987; Smit et al., 1990). Since these children have all been in the U.S. at least one year, one could argue that the phonemes that they had acquired in Spanish at the time of their arrival were basically the same phonemes that an English-speaking child at the same age would be using

The fact that the phonological skills of PS children were not significantly stronger in Spanish than English may also suggest that the assigned language use group did not accurately represent the true degree of language ability across language for all of the children. The PS children demonstrated phonological skills that were fairly balanced across languages, much like the children in the bilingual group. Given that the PS and BI groups performed so similarly in both languages, this may suggest that these children are more balanced in terms of language exposure and use rather than representing two distinct degrees of language use as was originally proposed by this study.

Language Skills

Language skills were examined using two measures from the WLPB-R. The Picture Vocabulary (PV) subtest was used to measure children's expressive vocabulary with a picture naming task. The Memory for Sentences (MS) subtest was used as another measure of expressive language skill. This subtest required children to make use of sentence meaning in order to remember and recall words and phrases.

Picture Vocabulary

On average, vocabulary skills for all groups in both languages were low. The PE group performed just within one standard deviation of the mean on the vocabulary measure in English. Spanish vocabulary scores for the PE group, however, fell more than two standard deviations below the mean. Therefore, although the PE group demonstrated fairly strong phonological skills in both languages, they had very different vocabulary knowledge in each language. This finding suggests that phonological skills may be more developed than vocabulary skills in these children. This discrepancy between phonology and language may be occurring for one of two reasons: 1) the children are developing

good phonological skills across languages naturally because the phonologies are so similar or 2) the children are excelling in phonological development because these skills are heavily targeted in preschool curricula and these ELL children are exhibiting cross-linguistic transfer of phonological skills (Durgonoglu, 2002; López & Greenfield, 2004).

Given the disparity in the PE children's vocabulary scores across languages, it appears that vocabulary knowledge does not transfer as easily across languages as phonological skill. A reason for this may be that these children are not acquiring the same type of lexical information across languages. For example, all of these children have attended at least one year of preschool in the U.S. and have been immersed in programs where English is the primary language of instruction. Since they are exposed to many early literacy concepts in English, it is likely that they have acquired more words in English that express academic concepts or the types of items on many vocabulary tests. In contrast, the Spanish that these children are exposed to comes largely from their interactions in social settings at home and in the community. Therefore, the words children are using in each of the contexts, and in each of the languages, may represent different aspects of their lexical knowledge and their word knowledge is not being adequately captured during vocabulary testing (August et al., 2005; Peña, et al., 2003).

In an attempt to more completely measure the vocabulary knowledge of ELL children, an approach called conceptual scoring has been used by some researchers to give children credit for unique words used in either language (Bedore, et al., 2005; Pearson et al., 1993). To explore the possibility that the vocabulary measure used in this study did not fully capture the abilities of these children, analyses of a small sample (20%) of children's vocabulary performance was conducted using a conceptual scoring

approach. To accomplish this, the raw scores from the PV subtest were re-calculated for each child in order to create a new “conceptual” score. To generate the conceptual score, one point was awarded for each correct response that was unique across languages (e.g. if a child said “dog” and “perro” he got just one point for having that vocabulary concept; he also got one point for each item named correctly in either language). When compared to the raw scores for the individual tests (e.g. English and Spanish vocabulary scores separately), the new conceptual scores raw scores were nearly identical, suggesting that there was little difference in performance from the original results on the standard measure in each language. In other words, on this particular subtest, these children did not benefit from the conceptual scoring because they knew many of the same words in both languages. It should be noted, however, that nearly all of the early-appearing items on the PV subtest were translation equivalents (e.g. the same words were assessed in English and Spanish). Many children did not score high enough to benefit from the conceptual scoring of later-appearing items that were unique to each language. The lack of a difference in vocabulary score using conceptual scoring is consistent with the findings of Tápanes (2007) who discovered no significant differences in performance on the WLPB-R PV subtest for her participants.

Another explanation for children’s low performance is that vocabulary instruction may not be happening with sufficient intensity and intentionality to support adequate vocabulary knowledge in Spanish or English. The PS and BI groups’ vocabulary performance fell more than two standard deviations below the mean in both languages. In Spanish, the PS group had better vocabulary skills than the BI group and in English, the BI group outperformed the PS group. The PS group, however, performed better on

English vocabulary than would be expected and, although the difference was not statistically significant, average standard scores were actually 2% higher in English than Spanish. While these vocabulary scores were well below average, the relatively balanced English/Spanish vocabulary performance of the PS group is an interesting finding which may be related to two issues. First, all of the children in this study have been raised in the U.S. and have been exposed to English in their communities, on television, and often from their older siblings. Furthermore, all of the children have attended a preschool program for at least one year (if not more) and, while some of the programs use both languages in the classroom, the language of instruction is primarily English. Second, research has shown that cultural and linguistic minority children perform lower on standard measures of vocabulary compared to national norms. Again, this may be the result of these children bringing different home experiences to the preschool setting or it can be related to the fact that these children are not exposed to the type of academic concepts tested by these measures in both languages. Children who are bilingual often learn academic concepts from preschool instruction in English, while they use Spanish for social communication at home and in the community. As a result, different types of vocabulary knowledge may be presented and used in conversation.

Memory for Sentences

Except for the PE group in English (which performed just within one standard deviation of the mean), all groups fell more than 1.5 standard deviations below the mean in both languages on the MS subtest. The PE group performed significantly better in English than Spanish and the PS group performed better in Spanish than English, as would be expected (though this was not the case for the PS group on the vocabulary

measure). The BI group performed equally in each language. The latter finding could suggest that the MS subtest is more representative of the Spanish language skills of these children than the PV subtest. It has been well documented that children from cultural and linguistic minorities perform below average on standard measures of vocabulary (Páez et al., 2007; Restrepo et al., 2006; Wyatt et al., 2006). Furthermore, research on the language abilities of English- and Spanish-speaking children has suggested that children may perform better on more dynamic language measures than on standardized assessments of vocabulary (Fusté-Herrmann, Silliman, Bahr, Fasnacht, & Federico, 2006). The latter researchers found that although the Spanish-speaking children in their study scored lower on a vocabulary measure, they produced more complex and lexically diverse narratives than did the English-speaking children. It could be argued, then, that the MS subtest provided a more complete picture of the skills of the PS children than did the PV subtest. Despite a potentially better representation of these children's oral Spanish skills, however, performance on the MS language measure was still alarmingly low. Therefore, this finding suggested either that both of these measures were not adequately measuring the skills of the children or that these ELL children had not acquired strong language skills in either language.

Phonology and Vocabulary Interactions (Question 2)

Evidence was found suggesting that phonological skill may be a valid tool for gauging ELL children's vocabulary level in English, especially in the early stages of dual language development. For predominantly Spanish-speaking and bilingual children, English phonological skills were found to be a strong predictor of English vocabulary performance. In other words, as ELL children acquired more phonological skill in

English, they used these skills to acquire more English vocabulary. The premise that phonological development drives early vocabulary development has been suggested in research with younger monolingual children (Schwartz & Leonard, 1982; Swingley & Aslin, 2002). It may be possible that, as second language learners, the children in this study were experiencing a phonology-vocabulary interaction similar to the one cited in studies of younger children learning their first language. Furthermore, this predictive relationship was not seen for the PE children. Hence, this predictive relationship may only exist for the PS and bilingual children who, to a larger degree, are still negotiating two language systems simultaneously.

Spanish phonological skill was not found to predict Spanish vocabulary in any of the frequency of language use groups. Despite having comparable phonological skills in both languages, even the PS children demonstrated very low vocabulary performance in Spanish. As described earlier, the poor vocabulary performance of these children may be associated with the use of a standardized vocabulary assessment, which may not have adequately captured children's complete lexical knowledge. It may also be that children are mastering phonological skills in both languages at an early age, but they are not using these phonological skills to support the acquisition of new words.

It is also well known that ELL children learn basic oral communication skills in the second language within two to five years of initial exposure, but the acquisition of language skills to support academic learning takes at least five to seven years (August & Hakuta, 1997; Cummins, 1991; Hakuta, et al., 2000). While the below average English vocabulary performance of these preschool children may reflect their limited exposure to English, this does not fully explain the lack of vocabulary in their native language. To

better understand this, it would be necessary to look at the instruction these ELL children are receiving.

From an educational perspective, these results suggest that instruction of ELL students may not be targeting their true needs in the area of vocabulary development. Research in recent years has focused largely on the importance phonological awareness and phonemic awareness skills (Bus & van IJzendoorn, 1999). In response to well-documented evidence of the importance of these skills, practitioners, as well as many preschool curricula, may be focusing too narrowly on developing children's phonological abilities. As demonstrated by the children in this group (at least in terms of phonological production skills), this may be helping then to build the necessary phonological skills in the second language. What may be missing, however, is attention to fostering other literacy skills, like vocabulary knowledge, which is also important in achieving academic success (Gillam & Gorman, 2004; National Reading Panel, 2004; Scarborough, 2001; Troia, 2004).

Interestingly, evidence of a predictive relationship in the reverse direction was also found, suggesting that vocabulary development may be driving phonological development in some children. For both the PS and BI groups, English vocabulary skill was found to be a strong predictor of English phonological skill. This finding would indicate that the more English words in the vocabularies of bilingual children, the greater their phonological skills in English were likely to be. Research would suggest that as children acquire new lexical information, they must have sufficient phonological skill to differentiate newly-learned words from the ones stored in their existing vocabulary repertoire (Garlock et al., 2001). Similar research has also noted that as children's lexical

knowledge increases, performance on phonological tasks also improves (Sutherland & Gillon, 2005; Velleman & Vihman, 2004). The latter research corroborated the present study's finding that vocabulary knowledge predicted phonological skills among these ELL children.

For PS children, there also was an inverse predictive relationship, such that PS children with greater Spanish vocabulary skills had lower phonological skills in English. Since the age of exposure and amount of time exposed to the second language plays an important role in language development for ELL children (Goldberg, et al., 2008), it is likely that the children with comparatively higher vocabulary skills in Spanish had, thus far, received more exposure to Spanish than English. The importance of exposure to Spanish in the home was supported by the significant relationship between mother's Spanish ability and child's language ability found in this study. While prolonged exposure to Spanish has helped these children attain greater language skills in Spanish, they are not transferring (at least not yet) these skills into English. Furthermore, the vocabulary knowledge of these children remained very low in both languages, more than two standard deviations below the mean. As described earlier, and consistent with recent research, the latter finding is of great concern because, even over time, these children are not closing the vocabulary gap (Páez, et al., 2007). Therefore, while this inverse relationship may minimize over time (e.g. English phonological skills should increase with greater exposure to English), the vocabulary skills of these children will likely remain below average.

Family-Level Variables (Question 3)

Parent educational levels for these participants ranged from less than high school to an AA/BA degree. For analysis purposes, these differences in educational achievement were grouped into five education levels. Correlational analyses revealed that frequency of language use group and mother's education level were not significantly related to the children's performance on any of the assessment tasks. Although other research has linked mother's education level to children's language level (Westerlund & Lagerburg, 2008), this study did not replicate these findings. It is possible that when the children were split into language use groups, the sample size within each educational level became too small, resulting in a lack of statistical power.

Several interesting relationships were found between mother's language ability and children's performance on these articulation and language tasks. Regardless of frequency of language use group, mother's ability to speak English predicted children's phonological abilities. It is possible that mothers with higher English abilities were using more English around their children, so their children probably were practicing English with greater frequency at home. Similar findings have been cited by other studies noting that both the amount and type of language used by mothers have been found to influence children's language development (Girolametto et al., 1999; Huttenlocher et al., 1991; Tomasello et al., 1986).

While mother's language ability positively influenced child's phonological skills in English, disparate findings were found with regard to mother's language ability and vocabulary development in each of the languages. The amount of English used by the mothers was not found to predict children's acquisition of vocabulary in English. This is

consistent with the recent findings of Goldberg, Paradis, and Crago (2008) who noted that home English use did not produce any consistent effects on children's vocabulary development. In Spanish, however, mother's language ability was found to be predictive of the child's Spanish vocabulary development. Therefore, if the child was exposed to more Spanish at home, they tended to express a greater knowledge of Spanish vocabulary. Whether in relation to children's phonological skill (as in the case of mother's English ability) or children's vocabulary skill (as for mother's Spanish ability), it appeared that home language use played an important role in the development of language abilities for these ELL children.

Conclusion

Children in all language use groups demonstrated strong phonological skills, as measured by CPI and PWP, in both English and Spanish. Strength in phonological skill appeared to be related to frequency of language use, especially in English. Similarities in children's phonetic inventories across languages suggested that exposure to two languages did not interfere with phonological development in ELL children. The fact that English and Spanish share many of the same phonemes may contribute to this finding. Likewise, children's phonological skills, as measured by PWP, were consistent with the findings from the analysis of their phonetic inventories.

While phonological skill was a strength of the ELL children in this study, language skills, as measured by the PV and MS subtests, were significantly low. With the exception of the PE group in English who scored just within one standard deviation below the mean, all children performed more than 1.5 standard deviations below the mean for both subtests in both languages. A predictive relationship was found between

mother's English language ability and child's phonological skill, suggesting that when more English is used in the home, children exhibited greater English phonological production skills. Evidence for the importance of using the child's native language in the home was also found, given that mother's Spanish language ability was shown to predict the child's level of Spanish vocabulary knowledge.

Clinical and Educational Implications

Phonological skills and vocabulary knowledge are among the strongest predictors of later academic success for all children (Dickinson et al., 2003; Tabors, et. al. 2001). Given current public policy, children attending schools in the U.S. must develop these skills in English in order to achieve academic success. For children learning English as a second language, this task may be especially challenging. It is the responsibility of practitioners working with this population to meet the literacy needs of these children.

The fact that English phonological skills were predictive of English vocabulary skills for predominantly Spanish-speaking and bilingual children highlighted the importance of spoken English language skills. Of concern, however, is the fact that even the children in the study with the greatest English phonological skills (and the highest vocabulary levels) were performing at the low end of average in English vocabulary, with even poorer skills in Spanish. For the PS and BI children, who are already scoring two standard deviations below the mean at the preschool level, the concern is even greater. While research has shown that ELL children do make gains in language skills over time, they are not closing the vocabulary gap by fourth or even eighth grade (Páez et al., 2007). Given the importance of vocabulary for reading and ongoing literacy development, these children may be starting out at a significant disadvantage.

In recent years, much attention has been placed on the development of phonological skills in the preschool years. Phonological skill is necessary to help children acquire other higher level metalinguistic skills (Foy & Mann, 2001; Sutherland & Gillon, 2005) and is an essential component of ongoing literacy development (Catts, 2001; Snowling & Hulme, 1994; Wesseling & Reitsma, 2001). One could argue that instruction in phonological skills is working for these ELL children given that all children had relatively high phonological skill in both languages. However, the phonological skills of these ELL children were not translating into a level of vocabulary knowledge adequate enough to support ongoing learning. While ELL children may benefit from the transfer of phonological skills across languages, they are not reaping the same benefit from cross-linguistic transfer of vocabulary knowledge. The alarmingly low vocabulary performance of these children highlights the need for more focused vocabulary intervention.

In order to ensure the delivery of adequate vocabulary instruction that meets the needs of these ELL children, it may be necessary to examine the strategies educators are using to teach vocabulary. It is suggested that teachers select vocabulary targets that are meaningful (e.g. conceptually related to what children are reading or studying), and that are of high interest. It is also important to remember that quality vocabulary development requires more than simply increasing the number of words in one's lexicon. Teachers are encouraged to build children's depth of vocabulary by introducing words with multiple meanings that can be used to represent the concepts being studied and by helping children make connections between words. This is particularly noteworthy for ELL children who may be struggling to get a vocabulary base in each language and may

require more explicit instruction to understand the connections between words and the multiple meanings of words.

In an effort to provide high quality vocabulary instruction, practitioners are also encouraged to employ strategies that capitalize on the interactions that occur between phonology and vocabulary development, as suggested by the findings of this study. To accomplish this, collaboration between teachers and Speech Language Pathologists (SLPs) is essential to meeting the needs of these children. Since SLPs have specialized expertise in the area of oral language development, they can offer unique insight into training language skills, including phonological skill and vocabulary knowledge.

While the importance of developing skills in English is well established, there is often great controversy over the role of ELL children's native language in their overall language learning needs. The findings of this study have suggested that exposure to and use of Spanish is beneficial. In fact, mother's Spanish language ability was found to be predictive of the child's Spanish vocabulary, supporting the importance of using the native language in the home environment.

Having strong Spanish skills alone, however, may not be enough to meet the language learning needs of these children, at least with regard to the developing sufficient vocabulary knowledge. This is evidenced by the fact that even the PS children in the study had very low vocabulary levels in Spanish. However, it is possible that their low vocabulary performance was related to the instrument used to measure Spanish vocabulary. It is well established that standard measures do not adequately capture the language abilities of culturally and linguistically diverse children, often because they

bring different language experiences than the test is measuring (Champion et al., 2003; Stockman, 2000). This may be the case for the children in this study.

Also, little is known about the quantity of Spanish used, or how it is used, in the homes of these children. Given that all children are receiving instruction largely in English, it is possible that their English vocabulary includes more of the academic items that may be tested on vocabulary measures, while their Spanish vocabulary consists of concepts used socially to interact with family members and other in the community. In fact, some research on the vocabulary skills of English- and Spanish-speaking children has noted that while Spanish-speaking children scored lower on vocabulary measures, their narrative productions included more linguistic complexity and greater lexical diversity (Fusté-Herrmann et al., 2006). Therefore, the possibility that children's language performance may differ based on the type of measure used should be taken into consideration when interpreting findings related to the vocabulary performance of ELL children.

Limitations and Future Directions

This study provides insight into the phonological and vocabulary skills for a group of ELL preschoolers. However, since no information was available on the native language skills that these children possessed prior to exposure to English, little can be concluded about the degree of interaction of the phonological skills in each language (e.g. whether L1 is transferring to L2 or vice versa). Future studies are encouraged to incorporate information on monolingual Spanish-speakers, as well as information on ELL children's skills prior to second language exposure, in order to identify the impact of each language on overall development of phonological skills over time.

Another limitation was that children were grouped by amount of language exposure and frequency of language use in the home and school settings. While other studies have established reliability and validity of parent reports of child language ability, there is evidence to suggest that the PS and BI groups in the present study had similar language skills, rather than representing unique degrees of language ability as was the intent of this study. Future research is warranted in this area in order to examine the skill development of these children when more is known about their level of language proficiency and dominance.

It has been suggested that standard measures of vocabulary may not adequately capture the language skills of children from cultural and linguistic minority populations. In the present study, for example, the PS children did not perform better in Spanish than in English on the vocabulary measure, as would be expected. They did, however, perform better in Spanish than in English on the Memory for Sentences subtest, which may have been more representative of the children's spoken language ability in their native language than the PV measure. Further research is recommended using other measures of language ability as a basis of comparison. It is also suggested that future studies incorporate a more dynamic assessment approach (such as the narrative analysis described earlier by Fusté-Herrmann et. al., 2007). Assessing vocabulary and language from this perspective may provide additional insight into the range of oral language abilities that ELL children possess. Using a battery of measures to examine a skills in a broader context (e.g. narrative language skills, depth of vocabulary, examining conceptual vocabulary knowledge across both languages, etc.) to create a composite picture of language ability is also recommended.

Finally, this study attempted to look at phonological skills in terms of whole-word production ability using the PWP measure. Since few studies have used PWP to measure phonological skills, further research using this measure is needed. The findings of this study suggested that minor modifications were necessary to allow use of the measure with speakers of Spanish. However, further research is needed to explore possible differences that may arise when using PWP across languages. Specifically, it has been suggested that languages like Spanish (and Finnish, according to one study) have a higher frequency of occurrence of multisyllabic words than does English (Saaristo-Helin, et al., 2006). While word length differences did not appear to affect findings in the present study (since PWPs were relatively high in both languages), further research is warranted in order to replicate these findings.

Despite these limitations, the findings of the present study suggest that ELL children are developing strong phonological production skills in both languages, and that their acquisition of English phonological skills (at least in terms of unshared phonemes) is associated with the amount of exposure to and frequency of use of English. While home language use contributed to children's development of language, the present findings suggested that the vocabulary knowledge of these ELL children may be well below average. Collaboration between teachers and speech-language pathologists is suggested in order to adequately meet the language learning needs of these ELL preschoolers.

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Appendices

Appendix A

Picture Vocabulary Target Responses

Sample:

A. Points to ball.

B. Points to cat.

1. *Points to fork.*
2. *Points to flower.*
3. dog
4. *Points to horse.*
5. *Points to baby.*
6. *Points to stove.*
7. *Points to soup.*
8. phone
9. fish
10. ball
11. scissors
12. banana
13. bike
14. star
15. shoe / sneaker
16. spoon
17. key
18. carrot
19. helicopter
20. lock
21. grasshopper
22. octopus
23. doorknob
24. light switch
25. waterfall
26. magnet
27. faucet
28. globe
29. igloo
30. theater
31. pyramid
32. panning gold
33. carriage
34. hinges
35. printing press
36. stethoscope

Sample:

A. Señala pelota.

B. Señala gato.

1. *Señala bebé.*
2. *Señala caballo.*
3. *Señala sopa.*
4. *Señala tenedor.*
5. *Señala flor.*
6. perro
7. pelota
8. zapato
9. *Señala estufa.*
10. cuchara
11. bicicleta
12. llave
13. pescado, pez
14. teléfono
15. tijeras
16. estrella
17. zanahoria
18. helicóptero
19. candado
20. copa
21. pulpo
22. calculadora
23. raqueta
24. mecánico
25. seta, hongo
26. cheque
27. imán
28. estampilla, sello
29. ajedrez
30. iglú
31. registradora
32. portaviones
33. candelabrio
34. llama, alpaca
35. trampoline
36. zodiaco

Appendix B

Memory for Sentences Target Responses

	English		Spanish
Sample:		Sample:	
A. car		A. auto	
B. hot food		B. leche caliente	
1. go		1. mesa	
2. boy		2. pan	
3. cookie		3. mamá	
4. house		4. ven	
5. play		5. cama	
6. good dog		6. niño alto	
7. cold milk		7. casa pequeña	
8. little bed		8. hombre bueno	
9. good candy		9. silla grande	
10. big house		10. buena comida	
11. Down the hill.		11. En la escuela.	
12. Come with me.		12. La flor silvestre.	
13. I sit in my chair.		13. La bebida fresca.	
14. The girl runs fast.		14. La niña camina despacio.	
15. I feed the cat.		15. La plantación de maíz.	
16. The car is blue.		16. El día está nublado.	
17. Trees grow very tall.		17. La calle angosta del pueblo.	
18. A bus can hold many people.		18. El niño había perdido su boleto.	
19. Use a towel to wipe glasses.		19. En el mercado tienen muchas clases de alimentos.	
20. Grocery stores sell many kinds of food.		20. Mis abuelos pasan sus vacaciones en la playa.	
21. Some dogs have learned how to do tricks.		21. En la ciudad hay gran variedad de edificios.	
22. A school is a large building with many rooms.		22. La secretaria escribe con una rapidez increíble.	
23. The shape of a leaf tells what kind of tree it is from.		23. Una entretenición de la juventud es la música moderna.	
24. Rocks may be used to make an interesting rock garden.		24. El mármol se usa mucho para decorar edificios públicos.	
25. The church bells rang and rang all day last Sunday.		25. La fotografía se manifiesta ante el mundo como un nuevo arte.	
26. Trains are taking more people than ever to different parts of the country.		26. Al atardecer de un día de noviembre, un grupo de músicos llegó a la ciudad.	

Appendix C

BIPA English Word List

Alligator	Dog	Puzzle	Vest
Arm	Doggie	Quarter	Washing
Ball	Door	Reading	Watch
Balloon	Dress	Red	Waving
Banana	Elephant	Ring	Web
Bath	Feather	Rocking	Window
Bed	Feet	Rose	Yellow
Belt	Fish	School	Yo-yo
Big	Five	Scrubbing	Zebra
Bird	Flower	Shaving	Zipper
Blocks	Fork	Shirt	Zoo
Book	Frog	Shoe	
Bottle	Gas	Shoes	
Box	Giraffe	Sink	
Boy	Girl	Sleeping	
Brush	Glove	Smell	
Bunny	Grapes	Sock	
Bus	Hand	Soup	
Cage	Hanger	Splashing	
Candle	Helicopter	Spoon	
Car	Jeep	Straw	
Carrot	Juice	Swinging	
Catch	Juicy	Teeth	
Cats	Jumping	Telephone	
Chair	Knife	That	
Cheese	Ladder	Them	
Chicken	Leaf	Thirsty	
Climbing	Leg	This	
Coffee	Matches	Three	
Comb	Milk	Thumb	
Computer	Moon	Thunder	
Cook	Mother	Tiger	
Corn	Mouth	Tomato	
Crayon	Nest	Toothache	
Cup	Nose	Toys	
Cute	Orange	Tree house	
Cutting	Pancake	Tub	
Desk	Pen	TV	
Dinosaur	Pig	Van	
Dishes	Plane	Vase	

Appendix D

BIPA Spanish Word List

agarrando	jabón	sol
aire	jamón	sopa
anillo	jarra	tambor
antiguo	jugo	teléfono
apagando	lápiz	tenedor
árbol	leche	tigre
auto	libro	tres
avión	limón	uvas
baño	madre	vela
boca	maíz	ventana
brazo	mano	yema
café	mesa	yuca
calor	música	zapatos
cama	ñame	
casa	ñandú	
cepillo	nariz	
cheque	niño	
chicle	noche	
chocolate	ñoño	
ciudad	ñu	
computadora	nubes	
conejito	oigo	
corriendo	papel	
cuatro	pared	
cuchara	peine	
cuchillo	pelo	
dedo	perro	
dientes	pez	
elefante	platos	
falda	pluma	
familia	puerta	
fiesta	queso	
flor	rey	
fresa	rojo	
galleta	ropa	
gallina	ruido	
gato	saco	
guagua	señora	
hierba	silla	

Appendix E

Parent Interview Questions

1. What is your child's birthdate?
2. Where was your child born?
3. How long has your child lived in the United States?
4. Add up all the time your child has been in your home country (after s/he moved to the U.S.) How long has s/he stayed there?
5. Does your child have any trouble hearing?
 - a. Does your child always have trouble hearing?
 - b. Only when s/he has an ear infection?
 - c. Only when the room is noisy?
 - d. Does your child have trouble hearing in... both ears? Left ear only? Right ear only? (or don't know)
6. Do you have difficulty understanding what your child says?
7. Do others have difficulty understanding what your child says?
8. Do you think your child has a speech problem? That is, a problem pronouncing words?
9. Do you think your child has a language problem? A language problem can include: beginning to talk late, having a small vocabulary, having difficulty combining words into sentences, making grammatical errors.
10. Has your child been tested by a speech therapist or speech teacher?
11. Has your child received speech therapy?
12. How far did you go in school?

Appendix E (Continued)

13. Does your child's father/stepfather live with you?
14. How often does your child's father/stepfather see your child?
15. What languages do you speak?
16. Rate your ability on the following. Use a scale from 1 through 5. (1=limited ability, 3= moderate ability, 5=very good ability, native-like)
 - a. Speaking English
 - b. Speaking Spanish
17. What language did you learn to speak first?
18. What language did your child's father/stepfather speak first?
19. What language do you speak when talking to your child's father/stepfather?
20. How old was your child (in months) when s/he started saying words in Spanish?
21. How old was your child (in months) when s/he started saying words in English?
22. How old was your child when your family started speaking Spanish to him/her?
23. How old was your child when your family started speaking English to him/her?
24. Now I have some questions about the languages your child speaks when talking to the following people and the languages they speak to your child.
 - a. You, the mother
 - i. Language you speak to your child?
 - ii. Language your child speaks to you?
 - b. Father/stepfather
 - i. Language he speaks to your child?
 - ii. Language your child speaks to him?

Appendix F

Questions Used to Create Language Use Profile

1. Language spoken by parent to child from birth to age 1
2. Language spoken by parent to child from age 1-2
3. Language spoken by parent to child from age 2-3
4. Language spoken by parent to child from age 3-4
5. Language spoken by parent to child from age 4-5
6. If attended Early Head Start; language spoken by teachers
7. If attended Early Head Start; language spoken by assistants
8. If attended Early Head Start; language spoken by other children
9. Language spoken by teacher in current education program
10. Language spoken by assistant in current education program
11. Language spoken by other children in current education program
12. Language father speaks to child
13. Father lives with/sees child (>3 days/week)
14. Language spoken by child to father
15. Language spoken by mother to child
16. Language spoken by child to mother
17. Language spoken by child to siblings
18. Language spoken by siblings to child