Published in final edited form as:

J Speech Lang Hear Res. 2012 October ; 55(5): 1251–1264. doi:10.1044/1092-4388(2012/11-0016).

Predicting Spanish–English Bilingual Children’s Language Abilities

Carol Scheffner Hammer^a, Eugene Komaroff^a, Barbara L. Rodriguez^b, Lisa M. Lopez^c, Shelley E. Scarpino^d, and Brian Goldstein^a

^aTemple University, Philadelphia, PA

^bUniversity of New Mexico, Albuquerque

^cUniversity of South Florida, Tampa

^dThe Richard Stockton College of New Jersey, Galloway

Abstract

Purpose—In this study, the authors investigated factors that affect bilingual children’s vocabulary and story recall abilities in their 2 languages.

Method—Participants included 191 Latino families and their children, who averaged 59 months of age. Data on parental characteristics and children’s exposure to and usage of Spanish and English were collected. The authors assessed children’s Spanish and English vocabulary and story recall abilities using subtests of the Woodcock–Muñoz Language Survey—Revised (Woodcock, Muñoz-Sandoval, Ruef, & Alvarado, 2005).

Results—Sizeable percentages of variation in children’s English ($R^2 = .61$) and Spanish ($R^2 = .55$) vocabulary scores were explained by children’s exposure to, and usage of, each language and maternal characteristics. Similarly, variations in children’s story recall scores in English ($R^2 = .38$) and Spanish ($R^2 = .19$) were also explained by the factors considered in this investigation. However, the authors found that different sets of factors in each category affected children’s vocabulary and story recall abilities in each language.

Conclusions—Children’s exposure to and usage of their two languages as well as maternal characteristics play significant roles in bilingual individuals’ language development. The results highlight the importance of gathering detailed sociolinguistic information about bilingual children when these children are involved in research and when they enter the educational system.

Keywords

bilingualism; language development; sociolinguistics; children; cultural and linguistic diversity

The number of bilingual children living in the United States has been growing at an increasing rate. Over a 15-year period from 1992 to 2007, the percentage of children who spoke a language other than English at home rose from 9% to 20%, with nearly 11 million children speaking two languages (National Center for Education Statistics [NCES], 2009). A similar increase has been observed in the preschool population, with approximately 30% of Head Start children learning two languages.

When young bilingual children come to school, they display varying abilities in their two languages (Bialystok, 2001), but the factors that contribute to these differences are unclear. Usage-based theories of language development may assist in explaining these variations. These theories assert that children's language reflects the input or exposure that they receive from the adults in their environment. Variations observed among children are the result of differences in the linguistic structures that they hear and differences in the frequency of their exposure to these linguistic structures (Tomasello, 2003a).

However, exposure alone is not sufficient. Children's linguistic abilities develop out of their usage of language. When learning a language, children begin by producing words and phrases that are influenced by the constructions to which they are exposed. They gradually learn a variety of ways of expressing themselves and ultimately discover linguistic patterns that allow them to create more general constructions (Tomasello, 2003b). In other words, "the linguistic environment provides raw materials out of which young children construct their linguistic inventories" (Tomasello, 2003a, p. 110).

Researchers have used usage-based theories to explain how monolingual children develop first words, early syntactic structures, and, ultimately, complex structures through children's active participation in interactions with adults. When describing development, the theories have focused on the types of input that children receive and the variations that occur in the linguistic input provided to children. Although these explanations have made valuable contributions to our understanding of how children acquire language, the theories have not explored how these differences in exposure may be due, in part, to variations in the characteristics of those who provide children's linguistic input. As a result, there is a need to consider such variations when studying children's development, including bilingual children's development. Therefore, in this study, we employed usage-based theories to examine bilingual children's language development. Specifically, we investigated the impact that children's exposure to and usage of their two languages had on their abilities in each language. In addition, we considered the role that parental characteristics played in development. In the following sections, we discuss key aspects of bilingual children's exposure and usage as well as parental characteristics.

Language Exposure

Bilingual children's exposure to their two languages can be captured in several ways. These include the length of time that they have lived in the country, the age at which they were regularly spoken to in their second language (L2), and the languages that parents and teachers use when talking with the children.

Evidence suggests that the length of time that children have been living in a country may affect their language abilities. This is due to increased exposure to their L2 in the community, educational settings, and the home as well as through television. Studies of immigrant families demonstrate that the younger someone is when he or she moves to the United States, the more likely he or she will be exposed to, and use, the English language (Portes & Schauffler, 1994; Veltman, 1988).

The age at which parents and/or key individuals in children's lives talk to them in their L2 captures a different aspect of exposure. Interactions with family members or teachers require children's active participation in the communication, as opposed to the passive involvement that occurs when observing interactions in the community or watching television. Findings on sequential and simultaneous learners suggest differences in bilingual children's language development, depending on the age at which they are exposed to their L2. For example, sequential learners were found to have higher abilities and faster rates of vocabulary growth

in their first language (L1) and L2 than those of simultaneous learners (Hammer, Lawrence, & Miccio, 2008; Oller & Eilers, 2002).

However, differences are not found consistently in all aspects of bilingual children's development. Hammer and colleagues (2008) found that bilingual children's rates of growth in oral comprehension were similar, regardless of age of exposure. This finding held for children's growth of their L1 and L2. Thus, it appears that age of exposure plays a role in some but not all aspects of bilingual children's language development.

Because the family is the key socializing agent from which children learn language, the role of parental language usage in the language development of their children also must be examined (Arriagada, 2005; González, Umana-Taylor & Bamaca, 2006). Research has shown that parents' usage of children's L1 in the home supports children's development of that language (De Houwer, 2007; Veltman, 1981). For example, Gutiérrez-Clellan and Kreiter (2003) observed that parental usage of their native language predicted children's grammatical abilities in that language. Additionally, Hammer, Lawrence, Davison, and Miccio (2009) demonstrated that maternal usage of Spanish resulted in faster rates of Spanish vocabulary growth in young bilingual children, whereas maternal usage of English slowed children's Spanish vocabulary growth. Maternal usage of English or Spanish did not affect children's English vocabulary growth. It was thought that children received sufficient exposure to English in preschool and kindergarten and in their communities; thus, maternal language usage did not have an effect.

Less attention has been given to the role of fathers' language to their children. Research suggests that fathers' language usage may be more influential than mothers' language usage on children's language. Veltman (1981) found that when fathers were English monolinguals, nearly half the children were English monolinguals, even when mothers typically spoke Spanish. However, when fathers usually spoke Spanish and mothers were English monolinguals, less than 20% of children were English monolinguals.

The language that children's teachers use to communicate with them is also likely to affect children's development. In the United States, the majority of preschool teachers are monolingual English speakers, and English is typically the primary language of instruction (Tabors & Snow, 2001). This gives children the message that English is necessary in order to successfully communicate and that English is the preferred language (cf. Cummins, 1979; Schecter & Bayley, 2002). This, in turn, may affect children's language abilities. Duursma and colleagues (2007) concluded that children's exposure to English at school was so powerful that parental usage of English was not required to promote English language growth; however, children's development of Spanish required support from teachers and parents.

Language Usage

Most of the research has focused on children's exposure to their two languages; however, a few studies have investigated children's language usage. For example, Hammer, Rodríguez, Davison, Lawrence, and Miccio (2011) observed that young bilingual Spanish-English children increased their usage of English when talking with their mothers. Children were 1.5 times more likely per year to use more or all English when speaking to their mothers. In addition, researchers have begun to investigate the relationship between language usage and outcomes. Bohman, Bedore, Peña, Mendez-Perez, and Gillam (2010) found that kindergarteners' usage of each of their languages was related to abilities in both languages. Specifically, increased usage of English was correlated with higher English semantic and morphosyntactic abilities, and higher usage of Spanish was related to higher Spanish abilities in those areas. Bohman et al. explained that children's production of their two

languages is important because “using a language forces the learner to process the language in a way that only hearing it does not” (p. 339).

Studies focusing on child and teacher language have focused on sociocultural effects and on the impact of the school environment on children’s maintenance and loss of their L1. In general, children move toward English usage quickly, even at home, after they enter the educational system (Veltman, 1988; Wong Fillmore, 1991). Therefore, we predict that the language children use when speaking to their teachers will affect their language abilities.

Parental Characteristics

In addition to language exposure and usage, variations in bilingual children’s language outcomes may be affected by variations in the characteristics of their parents who provide their linguistic experiences. In particular, parental education, generational status, and language proficiency are key parental factors that may affect bilingual children’s language abilities.

Research has consistently demonstrated that parental education plays a significant role in children’s language outcomes. Studies of monolingual children show that higher levels of parental education are associated with more advanced vocabulary, language, and reading abilities in children (Beitchman, Hood, & Inglis, 1992; Brooks-Gunn, Han, & Waldfogel, 2002; Hart & Risley, 1995; NCES, 2009; Snow, Burns, & Griffin, 1998). Similar results have been found in bilingual populations. In particular, research has shown that maternal education affects bilingual children’s development of English—their L2. For example, higher maternal education is associated with higher English vocabulary scores in bilingual kindergartners (Bohman et al., 2010), faster English vocabulary development in 5- to 7-year-old bilingual children (Golberg, Paradis, & Crago, 2008), and greater knowledge of English in adolescents from immigrant families (Portes & Rumbaut, 2001).

In addition to parental education, the number of generations a family has been in the United States may affect children’s developing language abilities. Studies of immigrants have shown that use of the new country’s majority language increases over successive generations. More specifically, research that examined the language usage of immigrants in the United States demonstrated that the first generation maintains use of its native language, with only some individuals beginning to speak English (Veltman, 1988). The second generation continues to speak its native language to varying degrees, but usage of English is well established (Hurtado & Vega, 2004; Portes & Hao, 1998; Zentella, 1988). By the third generation, the native language is often lost, and English becomes the primary language of the home (Arriagada, 2005; Hurtado & Vega, 2004; Veltman, 1983). Therefore, children’s abilities in their parents’ native language as well as English may be affected by the generational status of their parents.

Generational status, however, may not be sufficient to explain children’s developing abilities. Parental language proficiency may also play a role, as shown by the work of Gathercole and Thomas (2007). Through their interviews, the researchers found that Welsh parents’ own language proficiency was associated with the language(s) that parents used when speaking to their children and the language(s) that children used when talking with their parents. Parental language proficiency has received less attention in the literature than maternal education and generational status. However, it is reasonable to predict that parents’ ability to speak their L2 would affect their children’s language usage and would affect the language models that they provide to their children. This, in turn, would play a role in children’s language outcomes.

Purpose of the Investigation

The purpose of this investigation was to identify factors that are related to young bilingual children's abilities in their two languages, with the outcomes of interest being children's English and Spanish expressive vocabulary and narrative recall abilities. The factors targeted were as follows: (a) children's exposure to their two languages as captured by the length of time that the children lived in the United States, the age at which children were communicated with regularly in English, and the language(s) currently used by mothers, fathers, and teachers when talking with the children; (b) children's usage of their two languages with their mothers, fathers, and teachers; and (c) parental characteristics that included parental education, generational status, and maternal language proficiency. We hypothesized that these factors would affect children's development of their two languages but that different factors would play a role in the four outcomes of interest (Bohman et al., 2010).

It should be noted that children from two-parent homes were the focus of this investigation. This was to acknowledge the role that fathers' language interactions with their children may play in fostering bilingual children's language development. Often, studies either focus on maternal language or include father language as part of a composite variable. Because a large percentage of Latino households in the United States are made up of two-parent families, we investigated the impact of father-child language on the language abilities of young bilingual children.

Method

Participants

The participants included 191 Latino families and their children, who participated in a larger study of bilingual children's phonological development ($N = 448$). Participants were recruited from Head Start programs, school districts, and community-based pre-school programs located in urban areas of central New Mexico, central and southeastern Florida, and central Pennsylvania.

To be included in the larger investigation, the children had to be spoken to in a Mexican, Puerto Rican, or Cuban dialect of Spanish from birth. These dialects were targeted because they are the three most frequently spoken dialects of Spanish in the United States (U.S. Census Bureau, 2003). In addition, the children had no known neurological, physical, or cognitive concerns, as reported by the children's mothers. However, children whose parents had concerns about their speech and language development participated in the larger study. To be included in this study, the children had to (a) be typically developing ($N = 324$) and (b) come from two-parent homes ($N = 255$). Typically developing was defined as having no parental concerns about the children's speech and language abilities or hearing and having no history of speech-language therapy. The final sample ($N = 191$) for this study was determined by list-wise deletion— that is, participants were required to have data on all outcome variables and covariates (total = 20) that comprised the four initial and final linear regression models. Of these, 90 were from Florida, 78 were from New Mexico, and 23 were from Pennsylvania.

Characteristics of the parents and the children are provided in Table 1. The children's mothers averaged 33 years of age and 11.7 years of education. Their fathers averaged 35 years of age and slightly less than 11 years of education. The children averaged 59 months of age, and more than half of them were female.

Instruments

Background and Language Questionnaire—The Background and Language Questionnaire consisted of 64 multipart questions that elicited information on (a) parental education, employment, and language usage; (b) country of origin and length of time in the United States; (c) language experiences of the children with family members and teachers; and (d) children's educational and child care experiences. The questionnaire was based on the demographic/language usage questionnaire (August, Kenyon, Malabonga, Caglarcan, & Tabors, 2002) developed by the NICHD DELSS consortium of researchers, of which two of the authors were members.

Pertinent to this study, information was gathered on characteristics of the parents. This included the parents' ages, the number of years they attended school, and the generational status of the mother. Specifically, mothers were asked, "Of the following people, who was the first to move to the mainland of the United States?" Response options were as follows: you (the mother), your mother/father, your grandmother/grandfather, or your great-grandmother/great-grandfather. Mothers were also asked to rate their English proficiency on a scale of 1 (limited ability) to 5 (very good or native-like ability).

Mothers also responded to items about the children's exposure to English. This involved questions that targeted the age at which family members started speaking English to the children and the length of time that the children lived on the U.S. mainland. Also, information was gathered about the language(s) that children were currently exposed to when talking to their mothers, fathers, and teachers. Specifically, mothers were asked, "What language(s) do you/your child's father/your child's teacher use when speaking to your child?" Response options were as follows: all Spanish, more Spanish than English, equal Spanish and English, more English than Spanish, and all English.

Questions also targeted children's current language usage. These questions included, "What language(s) does your child use when speaking to you, his/her father, his/her teachers?" Response options were as follows: all Spanish, more Spanish than English, equal Spanish and English, more English than Spanish, and all English.

Woodcock-Muñoz Language Survey—Revised—Two subtests of the Woodcock-Muñoz Language Survey—Revised (WMLS-R; Woodcock et al., 2005) were administered in Spanish and English. The first subtest, Picture Vocabulary/Vocabulario Sobre Dibujos, assesses children's vocabulary development. The English version consists of 59 items, and the Spanish version consists of 58 items. The subtest begins with two receptive items in the English subtest and six receptive items in the Spanish subtest, in which the children are asked to point to a named picture within a small group of pictures. The remaining items on the subtests require the children to name each picture, with the items increasing in difficulty. The median reliability coefficient is .91.

The second subtest, Story Recall/Rememoración de Cuentos, measures listening, memory, and expressive language. The English and Spanish subtests consist of 11 stories that are read to the children, who then retell the story to the examiner. The stories range in length from one sentence to a few sentences, and each story consists of a group of elements that children are asked to recall. Children receive one point for each element that they include when retelling the stories. The median reliability of this subtest is .76.

Procedure

Data on parental characteristics and children's language exposure and usage were collected through parent report using the background and language usage questionnaire. Parental

report has been shown to be a highly feasible method for gathering information on children's language experiences. In numerous investigations, researchers have used similar methods when studying monolingual and bilingual children's language development (cf. Bohman et al., 2010; Dale, Bates, Reznick, & Morisset, 1989; Hammer et al., 2009; Gutiérrez-Clellen & Kreiter, 2003).

Trained bilingual data collectors administered the questionnaire to the children's mothers in the language of each mother's choosing. The data collector read each of the questions and recorded the mothers' responses into a computer using a software program known as Study Participant (Knightsoft, 2008) so that the mothers' answers could be exported into a database. The questionnaires took approximately 25–30 min to complete.

Trained bilingual assessors administered the subtests of the WMLS–R to the children in Spanish and English. Different assessors conducted separate testing sessions at least 1 week apart in each of the languages. Each testing session lasted 15–20 min. The language in which the children were first tested was counterbalanced.

Analyses

Modeling occurred in two stages. First, to identify factors that impact bilingual children's language abilities, we constructed separate univariate regression models for the four outcome variables: English Picture Vocabulary, Spanish Picture Vocabulary, English Story Recall, and Spanish Story Recall. We used children's W scores on the four subtests of the WMLS–R when performing the analysis. W scores are units of the W scale, which is an equal-interval scale developed by Woodcock and Dahl (Jaffe, 2009). The W scale for each of the subtests is centered at 500. This represents 10-year-olds' average performance (Alvarado, Ruef, & Schrank, 2005).

The predictive factors used in the regression models were divided into three categories: parental characteristics, children's language exposure, and children's language usage. Parental characteristics included generational status (i.e., the generation first to arrive on the U.S. mainland), maternal and paternal education, and mothers' reported proficiency in English. Children's language exposure was measured by the age at which children were communicated with regularly in English, the length of time that the children had lived in the United States, and the language(s) mothers, fathers, and teachers used when speaking to the children. Children's language usage focused on the language(s) that the children used when talking with their mothers, fathers, and teachers. Additionally, the children's chronological ages at the time of the test administration were included because W scores are not based on the children's ages.

We built the four linear regression models using several procedures in SAS Version 9.2 (SAS Institute, 2008). In addition to testing for linearity and assessing for the impact of outliers on regression coefficients, we also used graphic displays to assess the data. Histograms of residuals appeared to be normally distributed, variance of residuals appeared relatively constant across the range of predicted values, and there was no indication of multicollinearity among explanatory variables on the basis of variance inflation, tolerance, and Eigenvalue analyses.

In the second stage, we used PROC GLMSELECT to determine the final set of variables that predicted each outcome measure. This relatively new SAS procedure permitted a simultaneous evaluation of many fit criteria (statistics) for entry and deletion of explanatory variables. Specifically, we used the GLMSELECT procedure to apply seven default, computationally intensive, validation-based criteria: (a) adjusted R-square statistic (ADJR SQ), (b) Akaike information criterion (AIC), (c) corrected Akaike information

criterion (AICC), (d) Sawa Bayesian information criterion (BIC), (e) Mallows C(p) statistic (CP), (f) predicted residual sum of squares (PRESS), and (g) Schwarz Bayesian information criterion (SBC). As documented in the SAS/STAT Version 9.2 User's Guide (SAS Institute, 2008), the default selection methods are variants of the traditional step-wise selection where the decisions about what variables to add or drop at any step are based on optimal criteria. For example, smaller values of the SBC are considered a better model fit. Therefore, the variable whose removal yielded the maximal decrease in the SBC statistic was dropped sequentially by the method. Once no decrease in the SBC value was obtained by dropping variables, the variable whose addition to the model lowered the SBC statistic was added back to the model. This produced the set of optimal explanatory variables based on the SBC statistic. We employed the same process for the other selection criteria. We produced useful graphical summaries to identify variables that were deemed optimal or nearly optimal by all selection criteria. Next, we submitted this subset of variables to the standard regression procedure in SAS (PROC REG). The variables that failed to show statistical significance ($p > .05$) in the PROC REG procedure were removed from the model, thereby establishing the final subset of significant predictors.

Because list-wise deletion of participants who did not have data for every data point was performed, modeling also was performed through use of imputation. To run the regression analyses (both univariate and multivariable) with imputed values for missing data, we assumed that the data were missing at random and used two procedures in SAS/STAT software called PROC MI and PROC MIANALYZE (Yuan, 2000). The MI procedure is a multiple imputation procedure that creates multiple imputed data sets for incomplete p -dimensional multivariate data. There were no obvious missing data patterns; therefore, we used the Markov chain Monte Carlo (MCMC) method that assumed multivariate normality and created multiple imputations by drawing simulations from a Bayesian prediction distribution. In the "imputers model," we used all 13 covariates that were under consideration in this study. First, five data sets per model were imputed with MI, and then the MIANALYZE was used to combine results from the m complete data sets and generate valid statistical inferences about the model parameters (beta coefficients).

In addition, models were run with site (i.e., Florida, New Mexico, and Pennsylvania) as a factor. The findings did not change when these models were generated. The results of the complete case model and imputed model are presented in the sections that follow.

Results

Descriptive Statistics

Parental characteristics—The mothers and fathers averaged 11.7 and 10.9 years of education, respectively (see Table 1). More than half the mothers were the first to move to the U.S. mainland, with nearly one third being the second generation to live on the mainland.

The mothers' reported ability to speak English varied, as noted in Table 1. Approximately 26% of the sample rated themselves as having limited abilities in English; nearly 30% reported that they had very good or native-like abilities.

Children's language experiences—Data on children's language exposure are presented in Table 2. Children had lived on the U.S. mainland for approximately 54 months, on average. However, variability was observed, as indicated by an SD of nearly 14 months. Children were exposed to English on a regular basis at a mean age of 27 months, although the SD of 24 months was nearly as large. It was reported that the majority of mothers and fathers (60%) used all Spanish when talking to their children. Twelve percent of mothers

and 14% of fathers used more English than Spanish or all English with their children. Children's language experiences at school differed from their home experiences. Less than 2% of children's teachers used all Spanish when talking with them. Approximately 65% of the teachers spoke more English than Spanish or all English to the children.

With regard to children's language usage, a smaller percentage of children used all Spanish when speaking to their parents than when their parents spoke to them. We found that 45% of children spoke all Spanish to their mothers and fathers. More than 20% of children spoke more English than Spanish or all English to their mothers, and nearly 25% spoke more or all English to their fathers. When talking to their teachers, nearly half the children spoke all English or more English than Spanish.

Children's language abilities—Children's average W scores on the four language measures were as follows. The mean W scores for the English and Spanish Picture Vocabulary subtests were 425.3 (SD = 38.1) and 435.6 (SD = 29.5), respectively. (Note that the reported average for 5-year-old children in the test standardization sample was 468.) The large SDs demonstrate the great variability in vocabulary knowledge that existed in this sample. As reported by the publisher, the SDs for the Picture Vocabulary subtest ranged from 15.25 to 19.88 for 3- to 6-year-old children (Alvarado et al., 2005). The mean scores for the English and Spanish Story Recall subtests were 475.8 (SD = 12.2) and 471.3 (SD = 11.8), respectively, for our sample. (Note that the reported test average of 5-year-old children in the standardization sample was 488.) The reported SDs by the publisher for the Story Recall subtest ranged from 6.10 to 9.07 (Alvarado et al., 2005).

Because the W score may be unfamiliar to many readers, we reported children's standard scores. Mean standard scores and SDs on the four subtests were as follows: English Picture Vocabulary, 70.8 (SD = 27.9); English Story Recall, 87.9 (SD = 14.8); Spanish Picture Vocabulary, 76.5 (SD = 22.3); and Spanish Story Recall, 79.6 (SD = 15.2). Note that some children did not have a standard score because their raw scores and corresponding W scores were too low for them to receive a standard score. Thus, the average raw scores are likely lower than those reported above.

Correlations

There were moderate Pearson correlation coefficients (r_s) between English Picture Vocabulary and English Story Recall ($r = .65$, $p < .0001$) and between Spanish Picture Vocabulary and Spanish Story Recall ($r = .54$, $p < .0001$). The cross-language correlations were much smaller (Spanish Picture Vocabulary with English Picture Vocabulary, $r = -.26$, $p = .0002$) or essentially nonexistent (Spanish Story Recall with English Story Recall, $r = -.09$, $p = .236$).

Factors Impacting Children's Language Outcomes

The presentation of the modeling results begins with the reporting of the complete case model. The complete case model includes only participants whose data sets were complete for all the variables of interest in this study. This is followed by the presentation of the findings based on the imputed model.

Complete Case Model

Factors Impacting Outcomes—The four univariate regression analyses revealed that a large number of variables played a role in each of the language outcomes (see Table 3). With regard to children's vocabulary, all language exposure and usage variables were significant for children's English vocabulary, and the only variable that did not play a role in Spanish vocabulary scores was the children's length of time in the United States. Also, all

parental variables were significant, with the exception of generational status, which did not predict children's English vocabulary. In terms of children's English story recall, language exposure, language usage, and parental variables made significant contributions, with the exception being generational status. Additionally, children's Spanish story recall was not predicted by the length of time that children lived in the United States, the language that teachers used when talking to the children, or parental education.

Factors in the Final Complete Case Model

English vocabulary: The final regression model revealed that 61% of the variance in children's scores on the English Picture Vocabulary subtest of the WMLS-R was explained by the following six variables ($R^2 = .611$): children's chronological age, the children's length of time in the United States, children's language to their father, children's language to their teacher, maternal education, and maternal English language proficiency (see Table 4). That is, higher W scores on the English Picture Vocabulary subtest were predicted by increased age, higher maternal English proficiency, more time in the United States, higher usage of English by children with their teachers and fathers, and higher levels of maternal education. The children's language to their teachers had the strongest effect on children's English vocabulary (standardized beta weight [STB] = .29, see Table 4).

Spanish vocabulary: The final regression model explained 55% of the variance in Spanish vocabulary ($R^2 = .550$). The model contained seven variables: children's chronological age, the age at which the child was exposed to English, fathers' and teachers' usage of English to the children, children's usage of English to their mothers, generational status, and maternal English proficiency. All of these variables except children's chronological age had a negative impact on children's Spanish vocabulary. In other words, children's Spanish vocabulary scores were higher when children were older, children were older when they were first exposed to English, fathers and teachers used less English when talking with the children, children used less English when talking to their mothers, mothers were the first generation to arrive in the United States, and the mothers' English proficiency was lower. The children's language to their mothers had the strongest and most negative impact on Spanish vocabulary scores (STB = $-.38$).

English Story Recall subtest: The final regression model, which identified four variables, explained 38% of the variance of children's scores on the English Story Recall subtest ($R^2 = .380$). The model included chronological age, mothers' and teachers' usage of English to their children, and maternal education. In other words, increased chronological age, increased usage of English between mothers and children and between teachers and children, and higher maternal education resulted in higher scores on this subtest. Children's chronological age played the largest role (STB = .33).

Spanish Story Recall subtest: Children's Spanish story recall was the most difficult to explain. The final model, which included chronological age, children's language to their fathers, and maternal education accounted for 19% of the variance ($R^2 = .194$). That is, children's scores were predicted by higher chronological ages, less usage of English between children and their fathers, and higher maternal education. Children's usage of English to their fathers was the strongest predictor (STB = $-.39$).

Imputed Models

Results of the imputed models were similar to those of the models presented in the previous sections. As shown in Table 5, results of the univariate analyses revealed that a large number of variables played a role in children's outcomes. The only difference between the imputed and complete case models was that maternal English proficiency was not significant for

Spanish Story Recall. All other variables were significant in both the imputed and nonimputed models. In terms of the full model, results were highly similar (see Table 6). The R^2 values varied slightly between the imputed and nonimputed models. Additionally, the same predictors played significant roles in the four subtests, with the exception of two variables entered into the model for Spanish Picture Vocabulary. Maternal English proficiency and the length of time that children were exposed to English just missed statistical significance in the imputed models. This implies that these variables may be biased away from the null in the complete case Spanish PV model.

Discussion

The characteristics of bilingual families and the experiences that young bilingual children have with their two languages vary greatly and undoubtedly influence children's abilities; however, the field's understanding of the particular factors that impact children's outcomes is emerging. Guided by usage-based theories, in this study we investigated the role of language exposure and usage as well as parental characteristics on the English and Spanish vocabulary and story recall abilities of Latino children growing up in the United States. We hypothesized that children's abilities in their two languages are affected by the amount of exposure and usage of each language, recognizing that differences in parental characteristics also play a role. We also hypothesized that different factors would have an impact on the four outcomes that were investigated (Bohman et al., 2010).

In general, these hypotheses were confirmed for bilingual children's vocabulary abilities. The results revealed that a large percentage of the variation in children's English (61%) and Spanish (55%) vocabulary scores could be explained by the sets of factors considered in this investigation. Also, different factors in each of these categories affected children's vocabulary scores in their two languages.

The hypotheses were partially supported for bilingual children's story recall abilities. The sets of variables considered in this investigation explained a large proportion of the variation in children's story recall abilities, although not to the extent that they explained differences among children's vocabulary scores. Specifically, 38% and 19% of the variance for English and Spanish outcomes was accounted for. However, language usage did not play a role in children's English story recall, and language exposure did not affect children's Spanish story recall.

The Role of Exposure

Consistent with usage-based theories of language development, bilingual children's English and Spanish vocabulary and English story recall abilities were influenced by their exposure to each of their two languages; however, the aspects that influenced children's abilities differed. In terms of children's vocabulary abilities, children's exposure to language as captured by the length of time that children lived in the United States impacted their English outcomes. Children who lived on the U.S. mainland for longer periods of time had higher English vocabulary scores. In other words, living in a country where English is the dominant language influences children's vocabulary development, more so than usage of English at home and school—which is not to say that the home and school environments do not play a role.

The opposite was true, however, for children's Spanish vocabularies. Language usage at home and school played a significant role in supporting Spanish vocabulary development. Specifically, children had higher Spanish vocabularies when parents and significant others spoke to them in English later in life (meaning that they had longer exposure to only Spanish at home) and when their fathers and teachers spoke more Spanish than English to them.

Fathers and teachers may influence children because they may represent the outside world to children. Their usage of Spanish gives children needed exposure to the children's L1 and supports children's usage of their L1. This may counteract the message that children may be receiving from the broader environment—that English is the preferred language (Cummins, 1979; Schechter & Bayley, 2002).

With regard to story recall, children's English abilities were affected by exposure to English by their mothers and teachers. Within families, mothers tend to spend more time reading books and telling stories to children than do fathers (Bradley, Corwyn, McAdoo, & Coll, 2001; Snow, 1983), which provides children with exposure to this language genre. It is likely that mothers who use more English than Spanish have attended schools in the United States and may be more likely to tell the types of stories that are stressed in school and on tests. Also, mothers, including Latina mothers, have been shown to be more cognizant of their children's abilities and are more likely than fathers to elicit more complex language from their children (Tenenbaum & Leaper, 1997, 1998). Additionally, teachers typically include book reading as part of their daily classroom routines, a practice that exposes children to the style of narratives tapped by the Story Recall subtest. Thus, children's English story recall was supported by mothers and teachers who used English when talking to the children.

Children's Spanish story recall, however, was not supported by any of the aspects of language exposure that were considered. It may be that Spanish-speaking adults tell more traditional stories, which may differ from those that children were expected to recall on the test. Qualitative studies of Latino children's homes have shown differences between the cultural styles of Latino families and those styles used by the mainstream culture (cf. González, 2005; Schechter & Bayley, 2002). Therefore, exposure did not play a role.

The Role of Usage

Consistent with usage-based theories of language development, this study demonstrated that children's usage of both of their languages played a highly important role in their language development. In fact, children's language usage made the largest contribution to their abilities in each of these areas. This is a key finding as emphasis is typically placed on children's language exposure. Our study, combined with the work of Bohman et al. (2010), points to the importance of bilingual children's actual usage of their languages.

Specifically, children's usage of language with key communicative partners played a role in supporting their vocabularies in their two languages. Children who used more English than Spanish when talking with their fathers and teachers had higher English vocabularies, whereas children who spoke to their mothers in Spanish had higher Spanish vocabularies. Thus, the language that children choose to speak to key individuals influences their vocabulary abilities in those respective languages. Usage of English when speaking to fathers and teachers may play a large role in English vocabulary development because fathers and teachers may represent, to children, the larger community that tends to value usage of English. Recall that Veltman (1981) found that children were more likely to be English monolinguals when their fathers spoke more English, compared with families in which mothers spoke primarily English.

Alternatively, children's usage of Spanish when speaking to their mothers was related to the Spanish vocabulary scores. Latina mothers have been credited with being the conveyors of the family's culture and language (Arriagada, 2005; González, 2005; Veltman, 1981). Mothers may be reinforcing the usage of Spanish at home, which promotes Spanish vocabulary development.

The results for story recall are more difficult to explain, as language usage played a role in children's Spanish story recall but not in their English story recall. Specifically, children's usage of Spanish with their fathers supported their story recall abilities in Spanish. It may be that children's usage of Spanish with their fathers, who typically are working and who have not been part of the children's day, is helpful in supporting storytelling abilities. Studies of interactions between Latino children and their mothers and fathers have shown that fathers' contributions to their children's development differ, to some degree, from the contributions made by mothers (Tenenbaum & Leaper, 1997, 1998).

On the other hand, children's language usage did not support their English story recall. It may be that children's exposure to stories and narratives in English is sufficient for promoting children's abilities in these areas; however, further investigation is needed. It should be remembered that a portion of the variance was not explained by the variables targeted in this investigation. Therefore, other unidentified factors are playing a role.

Parental Characteristics

In addition to studying children's language exposure and usage, we expanded upon usage-based theories of language development and investigated the role that parental characteristics played in supporting bilingual children's outcomes. Consistent with past findings, children of mothers with higher education had higher English vocabulary skills, English story recall, and Spanish story recall. These findings are in keeping with previous results consistently showing that maternal education plays a role in children's language development in both monolingual and bilingual children (cf. Bohman et al., 2010; Brooks-Gunn et al., 2002; Golberg et al., 2008; Hart & Risley, 1995; NCES, 2009; Portes & Rumbaut, 2001; Snow et al., 1998).

Maternal education, however, did not play a role in children's Spanish vocabulary, which is consistent with the results of Bohman et al. (2010). Instead, mothers' generational status impacted children's outcomes. This finding indicates that children's Spanish vocabulary scores were higher when their mothers were the first generation to move to the U.S. mainland from their home countries. Children from families who moved to the U.S. mainland in previous generations had lower Spanish vocabulary scores. Studies of immigrant families have revealed that first-generation families are more likely to maintain primary usage of their home language than are later generations who gradually become English dominant over successive generations (cf. Hurtado & Vega, 2004; Veltman, 1988). Thus, children's Spanish vocabulary abilities are likely supported in the homes of relatively new arrivals to the United States.

Mothers' rating of their own ability to speak English also affected children's vocabulary abilities in both languages. Not surprisingly, mothers with high self-ratings of English proficiency had children with higher English vocabulary scores, whereas mothers with low English proficiency had children with high Spanish vocabulary scores. Mothers' proficiency in English has received limited attention in the literature; however, it warrants further consideration, given the role that it played in this investigation.

Limitations

One limitation of this study is that our findings explain less of the variation in children's storytelling abilities than in children's vocabularies. There are at least three possible reasons for this. First, children's narrative abilities constitute later developing language skills. Therefore, it may be difficult to determine the contribution the targeted variables make early in the developmental sequence.

Second, the Story Recall subtest of the WMLS-R may be tapping abilities other than language that are not affected by children's language exposure and usage. Recall that the Story Recall subtest required children to listen to stories of one or more sentences in length and to repeat back what they had heard. This requires children to attend to the stories and to remember key components of the stories, as children need to use particular words to receive credit for recalling the stories. It is likely that attention and memory are affected by variables not targeted in this investigation.

Third, the internal consistency reliability coefficients for the Story Recall subtests were modest. The median reliability was .76, and the internal consistency varied by age. The reliability for 4- and 5-year-olds was .66 and .69, respectively. Lower internal consistency makes it more difficult to accurately capture children's true abilities. This, in turn, complicates efforts to explain the differences among children's scores. In future studies, investigators may wish to consider using a task that demands less of children's memory and attention.

Other limitations of this study are that we did not investigate the role of language exposure and usage between the children and their siblings or the role of children's literacy experiences. Children's interactions with their siblings may impact their language abilities in their two languages. This may be particularly true for older siblings who have attended school and who may be more likely to speak English.

Children's exposure to literacy events may also play a role in their language outcomes. This is because English is the language of instruction in the majority of preschool classrooms in the United States (Tabors & Snow, 2001). Exposure to literacy events in Spanish may be necessary in order to promote children's Spanish vocabulary and narrative development. Therefore, in future studies, it may be valuable to consider the role of sibling language and children's literacy experiences.

Implications

The findings of this study demonstrate the applicability of usage-based theories to the study of bilingual children's language development. In particular, the findings highlight the importance of language exposure and usage for bilingual children. Given that more than half of the variation in children's vocabulary scores was explained by the factors considered in the investigation, it is clear that the role of exposure and usage needs to be considered when attempting to explain how bilingual children develop two languages.

Additionally, our findings demonstrate the need to broaden usage-based theories to consider the characteristics of the environment that shape children's linguistic experiences. Clearly, parents' educational level, language proficiency, and generational status played a role in bilingual children's language development. Parental characteristics influence the input that they provide their children, and their characteristics need to be considered when attempting to understand bilingual children's development.

Also, the findings highlight the need to gather detailed sociolinguistic information about children when working with them in therapy and when involving them in research. Often, parents are asked to provide information only about the primary language used at home at the current time. However, our results speak to the need to gather additional information—namely, the educational experiences of the mother and her English language proficiency. In addition, it is important to learn how long children have lived on the U.S. mainland and the age at which they were exposed to English. The length of time in which children have been exposed to English—in general and at home—impacts their vocabulary development of English and Spanish. Also, it is critical that the languages used by key adults and children be

identified, as children's current exposure to and usage of Spanish and English play a large role in each of the children's language outcomes. Gathering of specific information about children's language environment and experiences will help educators understand the developing abilities of the children whom they serve and will assist researchers better describe the process of bilingual children's language development.

Acknowledgments

This study was supported by Grant R01-HD051542-06 from the National Institute of Child Health and Human Development, the U.S. Department of Education, the Institute of Education Sciences, and the Administration for Children and Families, Office of Planning, Research and Evaluation. We also wish to acknowledge the significant contributions of our dear colleague, Adele W. Miccio, who passed away in 2009.

References

- Alvarado, C.; Ruef, M.; Schrank, F. Comprehensive manual. Woodcock–Muñoz Language Survey—Revised. Riverside Publishing; Itasca, IL: 2005.
- Arriagada PA. Family context and Spanish-language use: A study of Latino children in the United States. *Social Science Quarterly*. 2005; 83:599–619.
- August, D.; Kenyon, D.; Malabonga, V.; Caglarcan, S.; Tabors, P. Parent Interview Response Sheet. Center for Applied Linguistics; Washington, DC: 2002. Retrieved from www.cal.org/acquiringliteracy/assessments/parentresponse.html
- Bialystok, E. Bilingualism in development: Language, literacy and cognition. Cambridge University Press; New York, NY: 2001.
- Beitchman JH, Hood J, Inglis A. Familial transmission of speech and language impairment: A preliminary investigation. *Canadian Journal of Psychiatry. Revue Canadienne De Psychiatrie*. 1992; 37:151–156. [PubMed: 1591663]
- Bohman T, Bedore LM, Peña ED, Mendez-Perez A, Gillam RB. What they hear and what they say: Language performance in young Spanish–English bilinguals. *International Journal of Bilingualism and Bilingual Education*. 2010; 13:325–344.
- Bradley R, Corwyn R, McAdoo P, Coll CG. The home environments of children in the United States. Part 1: Variations by age, ethnicity, and poverty status. *Child Development*. 2001; 72:1844–1867. [PubMed: 11768149]
- Brooks-Gunn J, Han W, Waldfogel J. Maternal employment and child cognitive outcomes in the first three years of life: The NICHD Study of Early Child Care. *Child Development*. 2002; 73:1052–1072. [PubMed: 12146733]
- Cummins J. Linguistic interdependence and the educational development of bilingual children. *Review of Educational Research*. 1979; 49:222–251.
- Dale P, Bates E, Reznick J, Morisset C. The validity of a parent report instrument of child language at twenty months. *Journal of Child Language*. 1989; 16:239–249. [PubMed: 2760125]
- De Houwer A. Parental language input patterns and children's bilingual status. *Applied Psycholinguistics*. 2007; 28:411–424.
- Duursma E, Romero-Contreras S, Szuber A, Proctor P, Snow C, August D, Calderon M. The role of home literacy and language environment on bilinguals' English and Spanish vocabulary development. *Applied Psycholinguistics*. 2007; 28:171–190.
- Gathercole, V.; Thomas, E. Factors contributing to language transmission in bilingual families: The core study—Adult interviews. In: Gathercole, V., editor. *Language transmission in bilingual families in Wales*. University of Wales; Bangor, United Kingdom: 2007. p. 59-182.
- Golberg H, Paradis J, Crago M. Lexical acquisition over time in minority L1 children learning English as a L2. *Applied Psycholinguistics*. 2008; 29:1–25.
- González A, Umana-Taylor A, Bamaca M. Familial ethnic socialization among adolescents of Latino and European descent. *Journal of Family Issues*. 2006; 27:184–207.
- González, N. *I am my language: Discourses of women and children in the borderlands*. University of Arizona Press; Tuscon, AZ: 2005.

- Gutiérrez-Clellen C, Kreiter J. Understanding child bilingual acquisition using parent and teachers reports. *Applied Psycholinguistics*. 2003; 24:267–288.
- Hammer CS, Lawrence FR, Davison M, Miccio AW. The effect of home language on bilingual children's vocabulary and emergent literacy development during Head Start and kindergarten [Special issue]. *Scientific Studies of Reading*. 2009; 13:99–121.
- Hammer CS, Lawrence FR, Miccio AW. Exposure to English before and after entry into Head Start: Bilingual children's receptive language growth in Spanish and English. *International Journal of Bilingual Education and Bilingualism*. 2008; 11:30–56.
- Hammer CS, Rodríguez BL, Davison MD, Lawrence FL, Miccio AW. Changes in language usage of Puerto Rican mothers and their children: Do gender and timing of exposure to English matter? *Applied Psycholinguistics*. 2011; 32:275–297.
- Hart, B.; Risley, TR. Meaningful differences in the everyday experiences of young American children. Brookes; Baltimore, MD: 1995.
- Hurtado A, Vega L. Shift happens: Spanish and English transmission between parents and their children. *Journal of Social Issues*. 2004; 60:137–155.
- Jaffe, LE. Development, interpretation, and application of the W score and the relative proficiency index (Woodcock–Johnson III Assessment Service Bulletin No. 11). Riverside; Rolling Meadows, IL: 2009.
- Knightsoft. Study participant (Version 2) [Computer software]. Knightsoft of Michigan; Farmington, MI: 2008.
- National Center for Education Statistics. The condition of education. U.S. Government Printing Office; Washington, DC: 2009.
- Oller, DK.; Eilers, RE. Language and literacy in bilingual children. Multilingual Matters; Tonawanda, NY: 2002.
- Portes A, Hao L. E pluribus unum: Bilingualism and loss of language in the second language. *Sociology of Education*. 1998; 71:269–294.
- Portes, A.; Rumbaut, R. Legacies: The story of immigrant second generation. University of California Press; Berkeley, CA: 2001.
- Portes A, Schaufli R. Language and the second generation: Bilingualism yesterday and today. *International Migration Review*. 1994; 28:640–661.
- SAS Institute. SAS/STAT Version 9.2 user's guide. Author; Cary, NC: 2008.
- Schechter, S.; Bayley, R. Language as cultural practice: Mexicanos en el norte. Erlbaum; Mahwah, NJ: 2002.
- Snow CE. Literacy and language: Relationships during the preschool years. *Harvard Educational Review*. 1983; 53:165–189.
- Snow, CE.; Burns, MS.; Griffin, P., editors. Preventing reading difficulties in young children. National Academy Press; Washington, DC: 1998.
- Tabors, P.; Snow, C. Young bilingual children and early literacy development. In: Neuman, S.; Dickinson, D., editors. *Handbook of early literacy research*. Guilford Press; New York, NY: 2001. p. 159–178.
- Tenenbaum H, Leaper C. Gender effects on Mexican-descent parents' questions and scaffolding during toy play: A sequential analysis. *First Language*. 1998; 18:129–147.
- Tenenbaum HR, Leaper C. Mothers' and fathers' questions to their child in Mexican-descent families: Moderators of cognitive demand during play. *Hispanic Journal of Behavioral Sciences*. 1997; 19:318–332.
- Tomasello, M. Constructing a language. Harvard University Press; Cambridge, MA: 2003a.
- Tomasello, M. Introduction: Some surprises for psychologists. In: Tomasello, M., editor. *The new psychology of language*. Vol. 2. Erlbaum; Mahwah, NJ: 2003b. p. 1–14.
- U.S. Census Bureau. Language usage and speaking ability: A 2000 census brief. U.S. Government Printing Office; Washington, DC: 2003.
- Veltman C. Anglicization in the United States: The importance of parental nativity and language practice. *International Journal of Society and Language*. 1981; 32:65–84.

- Veltman C. Anglicization in the United States: Language environment and language practice of American adolescents. *International Journal of the Sociology of Language*. 1983; 44:99–114.
- Veltman C. Modeling the language shift process of Hispanic immigrants. *International Migration Review*. 1988; 22:545–562. [PubMed: 12282084]
- Wong Fillmore L. When learning a second language means losing the first. *Early Childhood Research Quarterly*. 1991; 6:323–346.
- Woodcock, RW.; Muñoz-Sandoval, A.; Ruef, M.; Alvarado, C. Woodcock–Muñoz Language Survey — Revised. Riverside; Itasca, IL: 2005.
- Yuan, YC. Multiple imputation for missing data: Concepts and new development (SAS Institute Tech. Report No. P267-25). SAS Institute; Rockville, MD: 2000. Retrieved from <http://support.sas.com/rnd/app/papers/multipleimputation.pdf>
- Zentella, A. The language situation of Puerto Ricans. In: McKay, SL.; Wong, SC., editors. *Language diversity: Problem or resource? A social and educational perspective on language minorities in the United States*. Cambridge; New York, NY: 1988. p. 140-164.

Table 1

Parent and child characteristics, expressed as either *M (SD)* or percentage.

Characteristic	<i>M (SD)</i>	%
Mothers' characteristics		
Chronological age (yrs)	33.16 (6.25)	
Education (yrs)	11.66 (2.94)	
Generational status		
First generation		55.5
Second generation		32.5
Third generation		12.0
Mothers' English proficiency	3.03 (1.57)	
1 = <i>Limited ability</i>		25.7
2 = <i>Limited to moderate ability</i>		14.7
3 = <i>Moderate ability</i>		19.9
4 = <i>Moderate to very good ability</i>		10.5
5 = <i>Very good (native like)</i>		29.3
Fathers' characteristics		
Chronological age (yrs)	35.53 (7.26)	
Education	10.93 (3.19)	
Child characteristics		
Chronological age (mos.)	58.78 (8.74)	
Gender		
Male		44.5
Female		55.5
Birthplace		
U.S. mainland		81.2
Puerto Rico		8.9
Cuba		3.7
Mexico		5.8s

Table 2

Children's language exposure and usage, expressed as either M (SD) or percentage.

Characteristic	M (SD) (months)	%
Children's language exposure		
Length of time in United States	53.83 (13.59)	
Age children were exposed to English	27.07 (24.33)	
Maternal language to child		
All Spanish		59.7
More Spanish than English		14.1
Equal Spanish and English		14.1
More English than Spanish		8.4
All English		3.7
Paternal language to child		
All Spanish		59.2
More Spanish than English		14.1
Equal Spanish and English		12.6
More English than Spanish		6.8
All English		7.3
Teacher language to child		
All Spanish		1.6
More Spanish than English		7.3
Equal Spanish and English		27.2
More English than Spanish		24.6
All English		39.3
Children's language usage		
Language to mother		
All Spanish		45.0
More Spanish than English		19.4
Equal Spanish and English		14.1
More English than Spanish		12.6
All English		8.9
Language to father		
All Spanish		45.6
More Spanish than English		16.8
Equal Spanish and English		13.1
More English than Spanish		12.6
All English		12.0
Language to teacher		
All Spanish		7.9
More Spanish than English		26.7
Equal Spanish and English		16.2
More English than Spanish		16.2

Characteristic	<i>M (SD)</i> (months)	%
All English		33.0

\$watermark-text

\$watermark-text

\$watermark-text

Table 3

Univariate predictors (complete case model $N = 191$).

Characteristic	English Picture Vocabulary		Spanish Picture Vocabulary		English Story Recall		Spanish Story Recall	
	<i>B</i>	<i>p</i>	<i>B</i>	<i>p</i>	<i>B</i>	<i>p</i>	<i>B</i>	<i>p</i>
Chronological age	1.81	<.0001	0.78	<.0001	0.54	<.0001	0.27	<.0054
Language exposure								
Age of English exposure	0.72	<.0001	-0.44	<.0001	0.14	<.0001	-0.11	.0024
Child's length of time in U.S.	0.92	<.0001	0.20	.2169	0.22	.0005	0.02	.7647
Maternal language to child	14.43	<.0001	-15.44	<.0001	3.04	<.0001	-2.67	.0002
Paternal language to child	12.08	<.0001	-12.75	<.0001	2.21	.0012	-2.60	<.0001
Teacher language to child	12.71	<.0001	-5.86	<.0001	4.55	<.0001	-0.60	.4638
Language usage								
Language to mother	14.60	<.0001	-13.23	<.0001	3.05	<.0001	-2.72	<.0001
Language to father	14.56	<.0001	-11.66	<.0001	2.86	<.0001	-2.55	<.0001
Language to teacher	15.39	<.0001	-6.22	<.0001	3.87	<.0001	-1.59	.0098
Parental characteristics								
Generational status	1.56	.6943	-15.26	<.0001	-0.09	.9406	-3.18	.0090
Maternal education	5.14	<.0001	-1.80	.0131	1.52	<.0001	0.43	.1398
Paternal education	2.86	.0009	-1.47	.0285	0.84	<.0001	0.31	.2504
Maternal English proficiency	12.57	<.0001	-9.42	<.0001	2.63	<.0001	-1.22	.0256

Table 4

Final regression models (complete case model $N=191$).

Characteristic	English Picture Vocabulary ($R^2 = .611$)			Spanish Picture Vocabulary ($R^2 = .550$)			English Story Recall ($R^2 = .380$)			Spanish Story Recall ($R^2 = .194$)		
	<i>B</i>	<i>p</i>	β	<i>B</i>	<i>p</i>	β	<i>B</i>	<i>p</i>	β	<i>B</i>	<i>p</i>	β
Intercept	260.52	< .0001	.00	447.00	< .0001	.00	420.10	< .0001	.00	449.55	< .0001	.00
Chronological age	0.91	.0003	.21	0.82	< .0001	.24	0.46	< .0001	.33	0.34	.0002	.25
Language exposure												
Age of English exposure				0.17	.046	.14						
Child's length of time in U.S.	0.48	.0024	.17									
Maternal language to child							2.08	.0010	.20			
Paternal language to child				-6.01	.0001	-.26						
Teacher language to child				-3.95	.0103	-.14	2.75	.0001	.24			
Language usage												
Language to mother				-8.12	< .0001	-.38				-3.21	< .0001	-.39
Language to father	6.50	< .0001	.25									
Language to teacher	8.00	< .0001	.29									
Parental characteristics												
Generational status				-5.97	.0128	-.14						
Maternal education	2.64	.0001	.20				1.14	< .0001	.27	0.78	.0045	.19
Paternal education												
Maternal English proficiency	4.25	.0042	.17	-3.40	.0054	-.18						

Note. Only significant beta weights are shown.

Table 5

Univariate predictors (imputed $N = 255$).

Characteristic	English Picture Vocabulary		Spanish Picture Vocabulary		English Story Recall		Spanish Story Recall	
	<i>B</i>	<i>p</i>	<i>B</i>	<i>p</i>	<i>B</i>	<i>p</i>	<i>B</i>	<i>p</i>
Chronological age	1.89	<.0001	0.61	<.0016	0.56	<.0001	0.17	<.0416
Language exposure								
Age of English exposure	0.78	<.0001	-0.40	<.0001	0.17	<.0001	-0.10	.0010
Child's length of time in U.S.	1.09	<.0001	0.14	.2766	0.24	<.0001	-0.003	.5445
Maternal language to child	15.54	<.0001	-14.38	<.0001	3.35	<.0001	-2.49	.0001
Paternal language to child	13.20	<.0001	-11.78	<.0001	2.46	.0001	-2.61	<.0001
Teacher language to child	12.77	<.0001	-5.54	<.0015	4.62	<.0001	-0.64	.4133
Language usage								
Language to mother	15.95	<.0001	-12.50	<.0001	3.41	<.0001	-2.68	<.0001
Language to father	15.32	<.0001	-11.06	<.0001	3.10	<.0001	-2.48	<.0001
Language to teacher	15.41	<.0001	-5.88	<.0001	4.16	<.0001	-1.34	.0258
Parental characteristics								
Generational status	5.06	.1575	-14.16	<.0001	0.16	.8950	-3.60	.0008
Maternal education	4.52	<.0001	-1.49	.0137	1.56	<.0001	0.49	.0525
Paternal education	2.72	.0003	-1.44	.0091	0.89	.0005	0.33	.1585
Maternal English proficiency	12.78	<.0001	-7.93	<.0001	2.94	<.0001	-0.79	.0918

Table 6

Final regression models (imputed $N = 255$).

Characteristic	English Picture Vocabulary ($R^2 = .638$)			Spanish Picture Vocabulary ($R^2 = .488$)			English Story Recall ($R^2 = .406$)			Spanish Story Recall ($R^2 = .158$)		
	<i>B</i>	<i>p</i>	β	<i>B</i>	<i>p</i>	β	<i>B</i>	<i>p</i>	β	<i>B</i>	<i>p</i>	β
Intercept	255.37	< .0001	.00	447.98	< .0001	.00	415.19	< .0001	.00	453.49	< .0001	.00
Chronological age	0.95	< .0001	.23	0.76	< .0001	.25	0.49	< .0001	.36	0.26	.001	.20
Language exposure												
Age of English exposure				0.15	.0578	.12						
Child's length of time in U.S.	0.55	< .0001	.20									
Maternal language to child							2.12	.0003	.19			
Paternal language to child				-5.66	< .0001	-.25						
Teacher language to child				-4.11	.0042	-.15	2.70	< .0001	.23			
Language usage												
Language to mother				-8.32	< .0001	-.38				-3.12	< .0001	-.37
Language to father	6.58	< .0001	.25									
Language to teacher	7.48	< .0001	.27									
Parental characteristics												
Generational status				-6.49	.0043	-.16						
Maternal education	2.67	< .0001	.21				1.33	< .0001	.31	0.84	.0006	.21
Paternal education												
Maternal English proficiency	3.94	.0022	.16	-1.99	.0578	-.11						

Note. Only significant beta weights are shown.