

Language Growth in English Monolingual and Spanish-English Bilingual Children from 2.5 to 5 Years

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Objective To describe the trajectories of English and Spanish language growth in typically developing children from bilingual homes and compare those with the trajectories of English growth in children from monolingual homes, to assess effects of dual language exposure on language growth in typically developing children.

Study design Expressive vocabularies were assessed at 6-month intervals from age 30 to 60 months, in English for monolinguals and English and Spanish for bilinguals. Use of English and Spanish in the home was assessed via parental report.

Results Multilevel modeling, including parent education as a covariate, revealed that children from bilingual homes lagged 6 months to 1 year behind monolingual children in English vocabulary growth. The size of the lag was related to the relative amount of English use in the home, but the relation was not linear. Increments in English use conferred the greatest benefit most among homes with already high levels of English use. These homes also were likely to have 1 parent who was a native English speaker. Bilingual children showed stronger growth in English than in Spanish.

Conclusions Bilingual children can lag 6 months to 1 year behind monolingual children in normal English language development. Such lags may not necessarily signify clinically relevant delay if parents report that children also have skills in the home language. Shorter lags are associated with 2 correlated factors: more English exposure and more exposure from native English speakers. Early exposure to Spanish in the home does not guarantee acquisition of Spanish. (*J Pediatr* 2017;■■■:■■■-■■■).

Delayed language development is a warning sign for multiple developmental disorders, including autism spectrum disorder, intellectual disability, and specific language impairment. For the large number of children who are exposed to more than 1 language, delay can be difficult to identify because there is insufficient evidence of what is typical to serve as a reference. As a result, language impairment and, by implication other developmental disorders, are sometimes overidentified or underidentified in bilingual children.¹ Identification of clinically significant delay is complicated further by the fact that in the US, families of dual-language learners are more likely to be poor and to have relatively low levels of education,² and these factors also are associated with delayed language development.³ The lack of information about normative bilingual development and the factors that shape it also limit pediatricians' knowledge about how to help bilingual families support their children's language development.

Some empirical studies have concluded there is no delay in language development associated with bilingualism.⁴⁻⁶ If this were the case, then any delay in language development in a bilingual child should be interpreted as would the same delay in a monolingual child. However, early empirical findings were never an adequate basis for concluding that bilingually developing children should look like same-age monolingual children in their single-language skills. The assertions that bilingualism causes no delay were based on studies in which the sample sizes were so small that no statistical comparisons were made, or sufficiently small (numbers of 7 and 13) that the power to detect differences was low.⁴⁻⁶ Those claims have been refuted by reanalyses^{5,7,8} of the data in Pearson and Fernandez⁴ and more recently by larger sample studies that have found that bilingual children, at least through 4 years of age, have smaller vocabularies and less-advanced grammatical skills than same-aged, monolingual children of similar socioeconomic status when comparison is made in terms of skill in only 1 language.⁸⁻¹⁵ When it is possible to estimate children's total vocabulary, combined across languages, bilingual children equal or exceed the levels achieved by monolinguals.^{5,10,15,16} Although the data now available make clear that in single-language comparisons young bilingually developing children's language skills are less advanced than the skills of their monolingual peers, many clinically relevant questions remain unaddressed. Studies have not described the trajectories of bilingual development among typically developing children from the preschool years past the age of 4 years. As a result, we do not know how big a lag is characteristic of typically developing bilingual children throughout the preschool period, and we do not know whether and when bilingually developing children catch up to their monolingual peers. There is good evidence that poor

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Supported by the National Institutes of Health (NIH) (R01 HD068421). The authors declare no conflicts of interest.

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<http://dx.doi.org/10.1016/j.jpeds.2017.06.071>

EOWPVT Expressive One-Word Picture Vocabulary Test

English language skills at kindergarten entry predict school difficulty through the eighth grade and probably beyond.¹⁷

We thus identified 112 children from Spanish-English bilingual homes and 39 from monolingual English homes and longitudinally assessed vocabulary growth at 6-month intervals from the age of 30-60 months. We describe the bilingual children's trajectories of English and Spanish growth as a function of their relative exposure to each language at home, adjusting for their parents' levels of education, and compare these trajectories with those of children from monolingual English speaking homes.

Methods

The participants were 112 children living in Spanish-speaking homes (56 girls, 56 boys) and 39 English monolingual children (20 girls, 19 boys). The inclusion criteria for all children were that they were full term and healthy at birth, had normal hearing based on parental report of otoacoustic emissions testing at birth, and showed no sign of communicative delay at 30 months based on parental report. Additional inclusion criteria for the children from Spanish-speaking homes were that at least 1 parent was born in a Spanish-speaking country, that the children had been exposed to Spanish and English from birth, and that the less-frequently heard language constituted at least 10% of the children's home language exposure. Detailed demographic information about the participants is presented in [Table I](#) (available at www.jpeds.com).

Participants were recruited through advertisements in local, free English and Spanish language magazines aimed at parents of young children, through flyers, and through word of mouth. Information about language use in the home was collected via interviews with each child's primary caregiver. Children's language skills were assessed at the ages of 30, 36, 42, 48, 54, and 60 months as part of a larger study of bilingual development.^{18,19} The attrition rate for the larger study during the period from 30 to 60 months was 17.5%. There were additional missing data for some participants at each assessment point. Exact mean age and sample size at each assessment point are presented in [Table II](#) (available at www.jpeds.com). The interview and assessments took place in the participants' homes or in a laboratory playroom, depending on the participants' preference. Approximately 85% of interviews and assessments were conducted in the participants' homes. The protocol was approved by the Florida Atlantic University institutional review board. Written informed consent, with consent forms available in English and Spanish, was obtained from parents and assent was obtained from the children before participation.

At each age, the monolingual children were administered the Expressive One-Word Picture Vocabulary Test (EOWPVT)²⁰ in English. The bilingual children were administered the EOWPVT—Spanish-Bilingual Edition²¹ in Spanish and in English, on different days in counterbalanced order, to obtain expressive vocabulary scores in each language. In the age range used in the present study, the items in the bilingual version of the EOWPVT are no different from those in the monolingual version. We analyzed the children's raw scores in English

and in Spanish. Norms for bilingual children are available only for a conceptual administration of the test, in which children are permitted to provide a label in either of their languages. We used the test, as have others,²² to obtain separate estimates of children's English and Spanish vocabulary knowledge.

Predictors

The primary caregiver reported each parent's highest attained level of education, and parents' levels were averaged. Less than high school degree was counted as 10 years, high school degree as 12, a 2-year associate degree as 14, 4-year college degree as 16, and all advanced degrees as 18 years.

Each child's primary caregiver estimated the child's relative amount exposure to English and Spanish in the home at each assessment point. Mean percentages of exposure to English at each age are presented in [Table II](#). Previous research suggests that such measures are reliable and are strongly related to diary-based measures of language use and to bilingual children's language skill.^{10,23} For children living in 2 households, a weighted average of the percentage of English heard in each home was calculated.

Statistical Analyses

Preliminary analyses of the relation of sex to children's vocabulary scores revealed no significant differences on any measure at any age, and thus sex was not included in further analyses. Separate longitudinal multilevel analyses were conducted to describe language trajectories and influences on individual differences in those trajectories for English, using all participants, and for Spanish, using only the bilingual participants. In both analyses, parental education was included as a continuous variable and time invariant covariate, and English exposure was entered as a continuous variable and time-varying covariate. The quadratic effects of age and English exposure, along with any possible predictor interactions, were added to models independently. The χ^2 difference tests of the $-2 \log$ likelihood model fit index were calculated to determine which models best fit the data. The models were computed via maximum likelihood estimation and unstructured covariance structures. All models were run in SPSS Statistics, Version 22.0, software (IBM Corp, Armonk, New York).²⁴

Results

Means and SDs of the observed English- and Spanish-expressive vocabulary scores at each age are presented in [Table III](#). The 2 final models that provided the best fit to the data are presented in [Table IV](#).

For English-expressive vocabulary as the outcome, including monolingual and bilingual children in the analysis, there was a significant positive linear effect of parent education ($P = .019$). Child age had a significant positive linear effect ($P < .001$) and negative quadratic effect ($P = .001$), indicating that children's scores grew at a decreasing rate over time. The effect of English exposure was a positive quadratic effect ($P < .001$), indicating that increases in English exposure at the higher range of exposure resulted in greater benefit to the chil-

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