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CHOOSING THE LANGUAGE OF
INTERVENTION FOR SPANISH–ENGLISH BILINGUAL
PRESCHOOLERS WITH LANGUAGE IMPAIRMENT

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Structured Abstract for Choosing the Language of Intervention for Spanish-English Bilingual Preschoolers With Language Impairment

Clinical Question: What is the most effective approach to treating bilingual children with language disorders?

Method: EBP Intervention Review

Study Sources: ERIC, ASHA Journals

Search Terms for Participants: bilingual and intervention children.

Outcome Terms: vocabulary, grammar, syntax, and morphology

Number of Included Studies: 4

Number of Participants: Total for all 4 studies = 733

Primary Results:

- (1) Bilingual children make progress in both bilingual and English-only programs.
- (2) Bilingual children are more likely to make gains in both of their languages if they continue to use both languages.
- (3) Treated children were more likely to learn the targeted language forms in their dominant language.

Conclusions: Maintaining the home language enables parents to support language development in a way that they may not be able to if their children are enrolled in an English-only school setting.

Choosing the Language of Intervention for Spanish–English Bilingual Preschoolers With Language Impairment

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Scenario

Katy is a speech-language pathologist working with Ricardo, who is 3 ½ years old, has just been indentified as having language impairment, and speaks predominantly Spanish. When Ricardo enrolled at school, the preschool teacher observed that he spoke much less than his peers and referred him for a speech-language evaluation. Ricardo's parents agreed to the evaluation because they also had noticed that he was not as talkative as his cousins or the children of their friends. Although he is older than the age range for the test, Katy collected data on Ricardo's vocabulary using the *MacArthur-Bates Communicative Development Inventories*, second edition (Fenson et al., 2006), and its Spanish counterpart (Jackson-Maldonado et al., 2003). She found that Ricardo was using only about 200 words across Spanish and English (though he knows more in Spanish), which is quite low for his age (Marchman & Martinez-Sussman, 2002). He has a mean length of utterance (MLU) of 2.3 words and only recently started to produce three-word utterances in Spanish. He combines words in English much less frequently than in Spanish. A Spanish-speaking child this age would be expected to regularly use three- to four-word utterances (Gutiérrez-Clellen, Restrepo, Bedore, Peña, & Anderson, 2000). In her interview with Ricardo's parents, Katy asked about his rate of growth in Spanish and English and found that he has been making slow, steady progress in each language. He rarely code switches, using Spanish with his family and English mainly at school. Thus, Katy is confident that the difficulties she is observing do not represent language loss due to exposure to two languages but true language impairment manifested in both of Ricardo's languages. Katy has decided to refer Ricardo for intervention and recommends that he attend a preschool program for children with language impairment. In the district where she works, there are options for bilingual or English preschool language intervention programs.

Ricardo's parents moved to the U.S. about five years ago. His parents are still in the process of learning English, and they are much more comfortable using Spanish at home. In their discussion with Katy, Ricardo's parents asked a number of questions about the kind of intervention that their son will receive and what he should be doing at home and school to improve his language learning. They commented that the teacher suggested that Ricardo's language might develop faster if he was spoken to only in English. Ricardo's parents are willing to speak more English with him at home and move him to a classroom where more English is spoken if those actions would be helpful. Katy and Ricardo's parents have also spoken about his possible participation in a bilingual preschool classroom-based intervention program. Ricardo's parents believe a bilingual classroom program using Spanish in addition to English would better reinforce Ricardo's learning at school. Yet, from their experience learning English, they know it can take time and that English is important for school. Because the family speaks more Spanish at home, Ricardo's parents want him to be able to speak to other Spanish speakers in his home environment.

Katy's opinion on this matter differs from that expressed by Ricardo's teacher. His teacher has stated the importance of supporting Ricardo's English development by starting to speak more English with him. Katy thinks that Spanish skills would support Ricardo's continued language and academic development while he is learning English, and that it is important for Ricardo to be able to speak with his family and community. Katy began a literature search for evidence that supports a data-based response to the questions Ricardo's parents are asking and the questions Ricardo's teacher is likely to ask.

Background

It is common to question the language used in intervention as it relates to direct services and supportive

contexts (i.e., which language to use at home, and whether or not to enroll children in bilingual classes when available). Speech-language pathologists can expect to be asked this question often, as the number of culturally and linguistically diverse students in U.S. schools continues to grow. Of bilingual children in the U.S., 79% are Spanish-English bilinguals (Office of English Language Acquisition, 2008). Bilingualism is more likely among the children of recent immigrants, and other commonly spoken languages in the U.S. include Vietnamese, Cantonese, Mandarin, and Hmong (Office of English Language Acquisition, 2008). The issues considered in the case of Ricardo can be generalized to children who speak these languages as well. A very common pattern of bilingual language development observed in U.S. schools is early sequential bilingualism, in which non-English-speaking children start to systematically learn English upon school entry, often at preschool or kindergarten age. Data from the Pew Hispanic Center (2004, March) show that first-generation immigrants are most likely to classify themselves as Spanish dominant or bilingual, by the second generation about half are bilingual, and by the third generation about 22% are bilingual; the rest consider themselves to be English dominant.

Clinician surveys over the last 10 to 15 years show that questions about how to best serve children from culturally and linguistically diverse backgrounds are common and persistent (Kritikos, 2003; Roseberry-McKibbin & Eicholtz, 1994). Bilingual language development, accurate assessment, and ways to work with diverse families are among the topics that clinicians most often suggest be included in training programs and continuing education (Caesar & Kohler, 2007; Kritikos, 2003). In many cases, clinicians like Katy will need to search out data on their own to develop this knowledge base.

Language Choice

On one hand, we know that the more experience a second-language learner has with the second language, the stronger his or her language knowledge is likely to be in the second language. For adult learners, length of exposure to the second language is associated with a diminished foreign accent and more nativelike grammatical judgments (Flege, Yeni-Komishian, & Liu, 1999; Johnson & Newport, 1989). Children who have started to learn a second language in preschool or the early school years are

likely to have vocabulary scores comparable to their peers and more advanced grammatical knowledge relative to peers who have been learning English for less time (Golberg, Paradis, & Crago, 2008; Jia & Fuse, 2007; Kohnert & Bates, 2002; Oller & Eilers, 2002). Vocabulary knowledge in particular is associated with literacy acquisition (Carlo et al., 2004; Oller & Eilers, 2002). Children from bilingual homes who become proficient in both languages have better educational outcomes as measured by school completion rates, grades, achievement test scores, educational aspiration, and personal adjustment (Feliciano, 2001; Portes & Hao, 2002; Schmid, 2001). Given the advantages of gaining bilingual proficiency, it stands to reason that children with language impairment might benefit from earlier input in their second language.

On the other hand, language loss is a challenge for bilingual children and their families. Language loss occurs when children who are learning a second language regress in their ability to recall words or to produce grammatical form and sentence structures in their first language (Anderson, 2004). The impact on families is substantial when children lose the language of their families and cannot communicate effectively (Fillmore, 1996; Pease-Alvarez, 2002). Children may also express frustration at not being able to communicate well with family members (Lopez & Tashakkori, 2006). A case study by Restrepo and Kruth (2000) comparing a child with language impairment with a classmate with typical language skills and earlier work by Kayser (1987) suggest that language loss may occur more quickly in children who have language impairment than in their typically developing peers. These findings suggest that if first language knowledge is an important consideration, then introducing a second language too soon might be counterproductive.

Methods

The purpose of the literature review is to determine what oral language changes are observed in both languages of bilingual children as a result of intervention. Katy used a broad definition of intervention as a systematic manipulation of language input and considered language intervention outcomes as well as studies of language change as a result of school experiences.

Information Retrieval

Katy selected two databases to identify research related to language learning in bilingual children. The Educational Resources Information Center (ERIC) database was used as the primary resource because it indexes a wide range of journals that cover the areas of education and bilingualism. It also indexes some work in the area of language impairment. Another advantage to the ERIC database is that it is available in the public domain, although not all of the work is available as full text links through ERIC. The second database was the American Speech Language and Hearing Association’s (ASHA) journal database available through the association’s website. The practical advantage of the ASHA database is that all of the articles identified are available to ASHA members as full text documents. Katy restricted her search to these two sources because they are readily available to clinicians in a school setting.

Search Terms

The search terms Katy identified for use in ERIC were *bilingual education*, *oral language*, *preschool* or *early childhood education*, and *speech therapy*. These terms were identified using the thesaurus available for keyword identification. In addition, the term *bilingual* was used in conjunction with the other terms, and narrow search terms (i.e., *vocabulary*, *grammar*, *syntax*, and *morphology*) were employed to further focus the search on oral language outcomes. The keywords Katy used to search the ASHA journals were *bilingual*, *intervention*, and *children*. To further extend the search, Katy used the same terms employed for the language outcomes (i.e., *vocabulary*, *grammar*, *syntax*, and *morphology*) to find articles related to oral language outcomes.

Results

Information Retrieval

The initial search included the following terms: *bilingual education*, *language impairment*, *oral language*, and *early childhood education*. However, these general terms were too restrictive as no citations were retrieved. A second search strategy involved elimination of the terms *language impairment* and *early childhood education* and produced a total of 833 citations.

The following list is a summary of the inclusionary and exclusionary criteria related to study selection:

Design

Group comparison

Independent Variable(s)

Compares language in education, intervention, input or

Compares language of intervention/education

Dependent Variable(s)

Oral language outcomes including

Vocabulary

Grammar

Syntax

Morphology

Participants

Preschool or kindergarten age and

Bilingual language environment

Publication

Peer-reviewed journal articles

English

Published between 1990–2009

After reviewing the citation abstracts, 16 studies were determined potentially appropriate for further consideration. Upon examining the full text of these citations, Katy found that many focused on older children and literacy interventions. Five studies were retained from this search. A final search was conducted, using *bilingual* and *language impairment* as the search terms and yielding one more study.

Katy conducted a similar set of searches in the ASHA journal database to determine if additional materials focusing on interventions for children with language impairment were available. No resources were identified using the general search terms of *bilingual education and language impairment*, *bilingual and language intervention*, or *language impairment*. Katy combined the terms *bilingual* and *language intervention* with *vocabulary*, *grammar*, *syntax*, and *morphology* successively to access information about language intervention. This search strategy yielded one unique study.

Descriptions of the Included Studies

Four studies (Barnett, Yarosz, Thomas, Jung, & Blanco, 2007; Hammer, Lawrence, & Miccio, 2008; Paez, Tabors, & Lopez, 2007; Winsler, Díaz, Espinosa, & Rodriguez, 1999) were selected for in-depth evaluation because they most closely matched the inclusion criteria. The four studies reported an intervention (in educational settings in all four cases) and assessed language outcomes in two languages. Two additional studies (Hammer, Lawrence, & Miccio, 2007; Rodriguez, Díaz, Duran, & Espinosa, 1995) reported on different aspects of the research reviewed here and were excluded as they provided no additional information to address the question of interest. The study design, including a description of the participants and language outcomes, is summarized in Table 1.

Because none of the four studies included children with language impairment and or language of intervention as a variable, three smaller intervention studies were reviewed (Kohnert & Danahy, 2007; Perozzi & Sanchez, 1992; Thordardottir, Weismer, & Smith, 1997). These studies did not meet the full set of criteria initially established for the review. They were evaluated, however, because they provided information about bilingual children with language impairment, language intervention, or individual level instruction that is like language intervention. The description of these studies includes information about the intervention and the outcomes but no information about effect size or study quality indicators. These studies are summarized in Table 2.

The four studies included a total of 733 preschool-aged children from bilingual backgrounds who were attending school in English, Spanish, or both. The 83 children in the Hammer et al. (2008) study received schooling in English, as did the control group of 50 children in the Barnett et al. (2007) study. The children in the Barnett et al. (2007), Paez et al. (2007), and Winsler et al. (1999) studies participated in bilingual education programs. The control children who lived in Puerto Rico from the Paez et al. (2007) study participated in a Spanish-only program. All of the studies included change in vocabulary knowledge as one of the outcome measures. Receptive vocabulary change was assessed using a version the *Peabody Picture Vocabulary Test* (Dunn & Dunn, 1981; 1997) and its Spanish companion, the *Test de Vocabulario en Imágenes Peabody* (Dunn, Padilla, Lugo, & Dunn, 1986) in three out of the four studies (Barnett et al., 2007; Hammer et al., 2008; & Winsler et al, 1999).

The Paez et al. and Barnett et al. studies assessed vocabulary using the picture vocabulary subtest of the *Woodcock Language Proficiency Battery* in English and Spanish (Woodcock, 1991; Woodcock & Muñoz-Sandoval, 1995). In addition to assessing vocabulary, several of the researchers evaluated change in grammatical development or language production. Hammer et al., for example, included the *Test of Early Language Development* (Hresko, Reid, & Hammill, 1999) to assess English and the *Preschool Language Scale* (Zimmerman, Steiner, & Pond, 1993) to evaluate changes in Spanish. Paez et al. employed the memory for sentences subtest from the *Woodcock Language Proficiency Battery* in which children repeat sentences that vary in complexity. Winsler et al. had a smaller number of participants and used a wider range of measures, including the lexical and language comprehension subtests in English and Spanish of the *Language Assessment Scales* (De Avila & Duncan, 1981) and measures of narrative productivity in both languages, including the numbers of words produced in their stories, the number of verbs, and the number of words per verb clause.

These studies were examined for a number of quality indicators including description of the participants, interventionists, and intervention, use of reliable and valid test instruments, randomization to treatment groups or use of control groups, and reports of missing data and attrition. Table 3 summarizes the quality indicators for each of the reviewed studies. Although no single study met all of the indicators, each of the studies reviewed had a number of strengths. The strengths of the Barnett et al. (2007) study were random assignment to classroom type, the description of classroom curricula and teacher training, and the use of measures with established levels of reliability. Hammer et al. (2008) did not set out to compare outcomes for two comparable groups of children but rather to compare change over time for children entering preschool with differing experiences. The strengths in the design of this study were the documentation of the participant characteristics, reported missing data, the outcome measures selected, and the ability of the outcomes to be generalized. Paez et al. (2007) documented the demographics and described home language use in relative detail, used measures with established reliability, and documented the number of children completing each assessment so that attrition rates were clear. Winsler et al. (1999) relied on a mix of established test instruments and descriptive measures but no reliability data. The

participants' language community was described, but the participants were described in less detail than in the other studies. A potential confound in this study was that groups were formed based on parent preference.

Selection of assessment tools could have been improved across the four studies. As Hammer et al. (2008) note in their discussion, measures such as the *Preschool Language Scale* and the *Test of Early Language Development* were standardized with monolingual speakers. This applies to other tests such as the *Peabody Picture Vocabulary Test* in its English and Spanish versions as well as the *Woodcock Language Proficiency Battery*. This factor influences the validity of the measures selected. Windsor et al. (1999) used language sample–based measures that are valid indicators of language development for bilinguals (e.g., see Gutiérrez-Clellen et al., 2000, for further discussion) but did not provide reliability information. These studies would also be improved by including treatment fidelity measures to ensure the bilingual programs were delivered as described and to document the amounts of Spanish and English used in these classrooms.

Effect sizes were provided by Barnett et al. (2007) for the whole model tested and by Paez et al. (2007) for the individual measure comparisons. Hammer et al. (2008) analyzed the data set to show rate of change for the two groups with a regression analysis and did not conduct an analysis of change in the individual measures. Winsler et al. (1999) did not provide measures of effect sizes. Table 4 includes measures of effect sizes with confidence intervals adjusted for sample size. The values in the Paez et al. (2007) study are included in Table 4. Effect sizes were calculated for the changes in scores on the individual measures for the remaining studies.

The Evidence-Based Decision

In reviewing the results of her search, Katy feels a little like a person hearing six blind men describe an elephant! She has different descriptions to try to fit together to figure out what the elephant of bilingual oral language outcomes looks like. The studies that she has read have each tackled the problem of understanding how differences in language experience in the classroom, at home, or in individual teaching relate to what children demonstrate that they have learned in different ways. Hammer et al. (2008) and Winsler et al. (1999) divided

children by their home language experiences. Barnett et al. (2007) conducted an experimental comparison of two-way immersion in Spanish and English versus English monolingual classrooms. Paez and colleagues (2007) evaluated the changes in Spanish and English made by bilingual children in a bilingual classroom as compared to the gains that Spanish-speaking Puerto Rican children made over the course of a year.

In deciding how to interpret these findings the study that stands out in regard to quality indicators is that of Barnett and colleagues. In this study, children improved their English language skills in either the two-way immersion program or the English-only program. But Spanish only improved for the children who participated in the immersion program. In terms of overall gains, the children in the bilingual program seemed to come out ahead because they were learning two languages. The Hammer et al. (2008) and Winsler et al. (1999) studies stand out for having more effect sizes that do not include zero (or no effect) in their range relative to the other two studies. Several of these were above 0.5, suggesting a moderate to large change or practically significant change. The findings of Hammer et al. (2008) and Paez et al. (2007) converge in two ways: In the Hammer study, children in the two groups made parallel gains with the home English children staying ahead of the children who started to learn English at school. In the Paez et al. study, it was the children in the Puerto Rican Spanish group who gained more Spanish. Thus it appears that children's gains follow the language in which there is the most input. The data from the Winsler et al. (1999) study show that in communities where children hear both languages they learn both languages, but greater gains were generally observed for the children who had participated in school.

Katy also considers what she found in reading about the work focused on individual level instruction. In the Perozzi and Sanchez (1992) study and in Kohnert and Danahy's (2007) results, it seems that it is more efficient for children to learn in their dominant language. It appears from the description of these two studies that all of these children knew more Spanish than English. However, teaching in the children's stronger language did not ensure that the children would learn all that was taught even in the individualized context. The children in the Perozzi and Sanchez (1992) study did not learn all of the vocabulary items they were presented with nor did the children in Kohnert and Danahy's (2007) study all reach

criterion in their stronger language. That said there seemed to be some advantages in accuracy or ease of teaching when children had exposure to the material in their stronger language. In the Thordardottir et al. (1997) study, the child with language impairment benefited from both strategies but made slightly faster gains in the home language on home vocabulary.

With all this in mind, Katy is confident in recommending that given the choice of a bilingual versus an English-only training program Ricardo's needs would be well served by the bilingual program. The data that she has seen shows that bilingual children make progress in both types of programs. However, children are more likely to make gains in both of their languages if they continue to use both languages. In the intervention studies, children were more likely to learn the targeted language forms in their dominant language. This is important for getting started in intervention. Maintaining Ricardo's home language and currently stronger language will permit his parents to continue to support his social and academic language development in a way that they may not be able to if he switches to an English-only school setting. Ultimately, evidence-based intervention choices depend on the combination of training methods that are effective in achieving their goals and are a good match for the needs and values of the client and his or her family (Dollaghan, 2004). In this case, bilingual intervention would achieve both.

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Table 1. Oral Language Outcomes

	Hammer et al. (2008)	Winsler et al. (1999)	Paez et al. (2007)	Barnett et al. (2007)
Participants	83 children from bilingual backgrounds 31 with English at school only 52 with English before school entry Age = 3:9 at school entry	Replication study =46 children from bilingual community Age range= 3:0–4:11 Longitudinal study= 41 children from same community followed for 2 years Age range = 3:6–5:11	319 Spanish–English bilingual PK students in Northeastern U.S.; 144 Puerto Rican Spanish-speaking PK students in Puerto Rico Age range = 4:0–4:11	100 children from a group of 300 randomly assigned to an English-only or two-way immersion bilingual program Age range = 3:0–4:11
Task or Treatment	Children with no English prior to preschool participated in 2-year Head Start program delivered in English with bilingual support from classroom aid	Participated in bilingual preschool program for 1 year (replication study) or 2 years (longitudinal study)	Participated in bilingual preschool program in Northeastern U.S.	Participated in two-way Spanish–English immersion with language of instruction rotating weekly. High Scope curriculum was used. Children were in school for 8 hours/day.
Experimental Comparison	Same preschool curriculum; compared to children with English at home prior to school entry	Stayed at home with family caregivers in a bilingual community	Participated in Spanish preschool program in Puerto Rico	Participated in monolingual English classrooms with High Scope Curriculum and bilingual support services for 6 hours/day.
Oral Language Outcome Measures	<i>Peabody Picture Vocabulary Test–III</i> <i>Test de Vocabulario en Imágenes Peabody</i> <i>Test of Early Language Development</i> (English) <i>Preschool Language Scale</i> (Spanish)	<i>Peabody Picture Vocabulary Test–Revised</i> <i>Test de Vocabulario en Imágenes Peabody</i> <i>Language Assessment Scales–Lexical</i> subtest (English & Spanish) <i>Language Assessment Scales–Language Complexity</i> subtest (English & Spanish) Number of verbs in narrative production (Spanish & English) Number of words per verb phrase (Spanish & English)	Woodcock-Johnson Picture Vocabulary subtest (English & Spanish) Woodcock-Johnson Memory for Sentences subtest (English & Spanish)	<i>Peabody Picture Vocabulary Test–III</i> <i>Test de Vocabulario en Imágenes Peabody</i> Woodcock-Johnson Picture Vocabulary subtest (Spanish & English)

Table 2. Results of Intervention and Experimental Studies

	Perrozi & Sanchez (1992)	Thordardottir et al. (1997)	Kohnert & Danahy (2007)
Participants	38 first-grade children in bilingual classroom who scored more than 1 <i>SD</i> below the mean on the Oral Language Cluster of the <i>Woodcock Language Proficiency Battery</i>	1 Icelandic–English bilingual child with language impairment	20 typically developing Spanish–English bilingual children from Head Start program
Task or Treatment	Participated in vocabulary instruction focused on prepositions and pronouns in English and Spanish	Participated in single-subject alternating treatment design focused on vocabulary intervention for home and school vocabulary in English and Icelandic	Participated in novel morpheme learning task in English or Spanish
Experimental Comparison	Spanish + English intervention compared to English only	Gains made in bilingual condition over gains made in English-only condition	Proportion of children learning novel morpheme by language
Results	Children learned more items and in fewer trials under bilingual than monolingual condition.	Child made gains under both conditions but slope is steeper indicating slightly faster gains in home language.	Most children met 90% correct criterion in Spanish but only 20% met the same criterion in English.

Table 3. Quality Indicators¹ Ratings²

	Hammer et al. (2008)	Winsler et al. (1999)	Paez et al. (2007)	Barnett et al. (2007)
Randomization	NA	0	0	2
Baseline equivalence	NA	1	1	2
Attrition	2	1	2	0
Participant description	2	1	2	2
Interventionist description	0	0	0	2
Treatment description	1	0	0	2
Blinding	0	0	0	2
Reliable outcome measures	2	1	2	0
Effect size estimates	2	0	2	2

¹ Quality indicators based on Law, Garret, and Nye (2004) and What Works Clearinghouse.

² Rating scale based on Law et al. (2004) (0 = inadequate, 1 = unclear, 2 = adequate, NA = not applicable because study is being evaluated on different criterion than that which it was designed for).

Table 4. Language Outcomes for English and Spanish Oral Language Measures

Hammer et al. (2008)	Measure	English at school <i>N</i> = 31		English prior to school <i>N</i> = 52		Cohen's <i>d</i> (CI)
		Pre (Fall yr 1)	Post (Spring yr 2)	Pre (Fall yr 1)	Post (Spring yr 2)	
English	PPVT	13.20 (9.20)	44.70 (12.77)	23.79 (13.31)	50.49 (16.41)	-.38 (-0.83–0.07)
	TELD-3	10.13 (4.13)	21.50 (4.30)	13.81 (5.69)	23.91 (5.80)	-.46 (-0.90– -0.001)
Spanish	TVIP	7.87 (6.50)	17.38 (13.35)	3.40 (3.12)	7.00 (8.81)	.97 (0.49–1.43)
	PLS	26.10 (5.93)	36.28 (6.70)	21.87 (7.44)	31.40 (9.02)	.60 (0.133–1.04)
Winsler et al. (1999)	Measure	Attend preschool <i>N</i> = 26		Stay at home <i>N</i> = 20		
Replication		Pretest (fall of PK)	Posttest (spring of PK)	Pretest (fall of PK)	Posttest (spring of PK)	
English	PPVT	6.69 (4.31)	12.12 (6.68)	5.00 (4.29)	8.20 (7.04)	.57 (-0.03–1.16)
	LEX comp	5.54 (1.68)	4.69 (1.87)	3.15 (1.79)	3.35 (1.81)	.73 (0.11–1.32)
	LAS lex	2.46 (3.29)	6.15 (3.81)	.85 (1.53)	2.65 (3.38)	.96 (0.33–1.56)
	Words/story	4.23 (7.50)	26.62 (34.52)	7.65 (25.68)	17.8 (33.94)	.26 (-0.33–0.84)
	Number of verbs	.54 (1.53)	4.42 (6.10)	.65 (2.91)	3.55 (7.09)	.13 (-0.45–0.71)
	Words/verb phrase	.2 (.49)	.56 (.70)	.10 (.47)	.37 (.66)	.28 (-0.31–0.86)
Spanish	TVIP	9.23 (8.80)	18.08 (19.87)	8.05 (8.15)	15.90 (13.08)	.13 (-0.46–0.71)
	LEX comp	5.15 (1.93)	6.77 (2.29)	4.65 (1.69)	5.30 (2.20)	.65 (0.04–1.24)
	LAS lex	8.42 (3.85)	11.42 (3.87)	8.30 (4.30)	10.10 (4.05)	.33 (-0.26–0.92)
	Words/story	42.42 (43.91)	58.65 (43.48)	36.00 (33.70)	44.85 (33.88)	.35 (-0.25–0.93)
	Number of verbs	8.35 (8.25)	11.12 (7.33)	5.45 (5.90)	8.50 (6.79)	.37 (-0.23-0.95)
	Words/verb phrase	1.12 (.88)	1.29 (.53)	.89 (.72)	1.02 (.66)	.46 (-0.14–1.04)

continued

Table 4. Language Outcomes for English and Spanish Oral Language Measures, continued

Longitudinal		Attend preschool N = 26		Stay at home N = 15		
		Pre (Fall yr 1)	Post (Spr yr 2)	Pre (Fall yr 1)	Post (Spr yr 2)	
English	PPVT	9.64 (7.61)	27.00 (11.70)	7.15 (10.83)	20.31 (13.31)	.54 (-0.11–1.18)
	LAS comp	3.77 (1.82)	5.81 (1.74)	3.33 (1.67)	5.25 (2.34)	.29 (-0.36–0.92)
	LAS lex	4.04 (4.48)	11.42 (4.11)	3.54 (3.60)	8.69 (6.45)	.54 (-0.12–1.17)
	Words/story	20.57 (37.86)	41.70 (30.78)	10.62 (17.21)	54.92 (39.34)	-.39 (-1.02–0.26)
	Number of verbs	4.46 (8.83)	13.83 (10.89)	1.77 (3.63)	9.08 (6.43)	.50 (-0.16–1.13)
	Words/verb phrase	.42 (.64)	1.16 (.68)	.60 (.88)	.93 (.58)	.36 (-0.29–0.99)
Spanish	TVIP	8.73 (5.44)	32.65 (14.02)	10.40 (4.94)	31.93 (16.12)	.05 (-0.59–0.68)
	LEX comp	5.92 (2.30)	7.27 (1.97)	6.87 (1.88)	6.80 (1.52)	.26 (-0.38–0.89)
	LAS lex	8.88 (4.32)	12.13 (4.79)	10.73 (3.39)	13.40 (3.74)	-.29 (-0.92–0.36)
	Words/story	42.42 (45.43)	109.26 (122.18)	36.21 (18.40)	83.14 (41.73)	.26 (-0.38–0.89)
	Number of verbs	8.05 (7.09)	19.19 (17.34)	6.36 (4.34)	14.57 (6.48)	.32 (-0.33–0.95)
	Words/verb phrase	.93 (.71)	1.13 (.60)	1.35 (.50)	1.21 (.28)	-.16 (-0.79–0.48)
Paez et al. (2007)	Measure	Treatment: U.S. Bilingual N = 306–318		Control: Puerto Rican Spanish only N = 144–152		
		Pretest (fall of PK)	Posttest (spring of PK)	Pretest (fall of PK)	Posttest (spring of PK)	
English	W-PV	68.08 (19.20)	70.53 (18.56)	NA	NA	--
	W-MS	73.08 (19.02)	77.22 (14.77)	NA	NA	--
Spanish	W-PV	65.28 (16.62)	62.01 (19.05)	84.04 (10.78)	86.99 (13.40)	-1.43 (-1.64– -1.2)
	W-MS	70.17 (16.91)	72.03 (16.68)	83.87 (17.59)	88.61 (12.70)	-1.07 (-1.27– -0.86)

continued

Table 4. Language Outcomes for English and Spanish Oral Language Measures, continued

Barnett et al. (2007)	Measure	Treatment: Two-way immersion N = 50		Control: English only N = 50		
		Pretest (fall of PK)	Posttest (spring of PK)	Pretest (fall of PK)	Posttest (spring of PK)	
English	PPVT	29.30 (16.50)	41.10 (16.50)	30.50 (17.30)	41.30 (16.70)	-.01 (-0.40–0.38)
	W-R-PV	15.5 (5.6)	18.6 (3.4)	15.70 (5.30)	18.90 (4.20)	-.08 (-0.47–0.31)
Spanish	TVIP	12.10 (9.00)	21.30 (12.20)	12.00 (11.20)	14.90 (10.70)	.56 (0.15–0.95)
	WM-R-PV	14.30 (3.20)	13.70 (3.60)	13.30 (3.90)	12.70 (4.00)	.26 (-0.13–0.65)