The Quality of Mother-Toddler Communication Predicts Language and Early Literacy in Mexican-American Children from Low-Income Households

Lauren B. Adamson[1], **Margaret O'Brien Caughy**[2], **Roger Bakeman**[1], **Raúl Rojas**[3], **Margaret Tresch Owen**[3], **Catherine S. Tamis-LeMonda**[4], **Daniel Pacheco**[3], **Amy Pace**[5], **Katharine Suma**[1]

[1.]Georgia State University

[2.]University of Georgia

[3.]The University of Texas at Dallas

[4.]New York University

[5.]University of Washington

Abstract

This longitudinal study documents the key role of early joint engagement in the language and early literacy development of Mexican-American children from low-income households. This rapidly growing population often faces challenges as sequential Spanish-English language learners. Videos of 121 mothers and their 2.5-year-old children interacting in Spanish for 15 min were recorded in 2009–2011 in the Dallas-Fort Worth metropolitan area. Researchers reliably rated general dyadic features of joint engagement—symbol-infused joint engagement, shared routines and rituals, and fluency and connectedness—that have been found to facilitate language development in young English-speaking children. The construct *respeto*, a valued aspect of traditional Latino parenting, was also rated using two culturally specific items—the parent's calm authority and the child's affiliative obedience. In addition, three individual contributions— maternal sensitivity, quality of maternal language input, and quality of child language production —were assessed. General features of joint engagement at 2.5 years predicted expressive and receptive language at 3.6 years and receptive language and early literacy at 7.3 years, accounting for unique variance over and above individual contributions at 2.5 years, with some effects being stronger in girls than boys. The level of culturally specific joint engagement did not alter predictions made by general features of joint engagement. These findings highlight the importance of the quality of early communication for language and literacy success of Mexican-American

children from low-income households and demonstrate that culturally specific aspects of early interactions can align well with general features of joint engagement.

Keywords

joint engagement; mother-child interaction; language development; early literacy; Mexican-American

By the time children begin formal schooling, they already display marked variability in language and early literacy skills that will affect their initial academic success (Duncan et al., 2007). In turn, early skills predict long term academic achievement (Entwisle & Alexander, 1998) and even health into adulthood (Freudenberg & Ruglis, 2007). Given the widely recognized importance of early academic achievement, researchers and policy makers alike have increasingly sought to identify the factors during early childhood that best support children's school readiness (Pace et al., 2017). Early language development appears to be one of the strongest precursors of school readiness (Hoff, 2013), prompting strong interest in how parent-toddler communication sets the stage for developing verbal skills (Adamson, 1995; Nelson, 2009).

Our overarching goal was to identify aspects of early interactions between toddlers and their Spanish-speaking Mexican-immigrant mothers from low-income households in the United States that predict successful language and early literacy acquisition. As a group, these toddlers face resource challenges related to higher rates of poverty in this population that place them at risk for language delays and early academic difficulties (Hussar et al., 2020; National Academies of Sciences & Medicine, 2017; Swanson, 2009). Moreover, as they enter formal schooling, they face linguistic challenges as sequential Spanish-English language learners who first learn Spanish at home and subsequetly begin to acquire English. The number of children designated as English language learners in U.S public schools increased by more than 30% between 2000 and 2017 (National Center for Education Statistics, 2020).

Despite the elevated needs of this growing population, few longitudinal studies have detailed the early experiences that lead to children's academic success (Castro, 2014). Systematic research on the path of language development from early home-based interactions to early elementary school taken by children in this rarely studied population has important theoretical and practical implications. Conceptually, this work provides the opportunity to discern if relations between early experiences that have been found to facilitate language development in monolingual English-speaking children also predict language success for sequential Spanish-English language learners. Moreover, in addition to seeing if previous research findings replicate, this work also explores the transfer between early experiences in Spanish and later outcomes in both Spanish and English. A growing literature reveals that various aspects of early Spanish acquisition including vocabulary size and language processing efficiency uniquely contribute to subsequent second language accomplishments (Marchman et al., 2020; Pace et al., 2020). Further, observing early periods in the development of sequential Spanish-English language learners allows us to consider how culturally specific aspects of early communication contribute to language and early literacy

outcomes. Such an expanded view of early experiences can provide crucial information for efforts to provide culturally sensitive recommendations for supporting the language and literacy success of the growing population of Mexican-American children.

Our approach to observing the path of language development in Mexican-American children reared in low-income families is distinctive in two ways. First, using the extensive archive compiled by the (authors' reference) project, we were able to describe mother-child interactions when the child was 2.5 years old, an age when communication begins to become increasingly dependent on language (Nelson, 2007). This strategy allowed us to describe how Mexican-American mothers nurture language acquisition at a time when many of their children do not attend formal preschool (Hussar et al., 2020) and to ask how aspects of these early interactions relate to language skills at age 3.6 and again during early elementary school.

Second, we focused on dyadic aspects of these early mother-child interactions. To date, most studies focus on maternal contributions such as language input (Rowe, 2012) and maternal sensitive responsiveness (Tamis-LeMonda et al., 2001). However, mounting evidence suggests that features of joint engagement, when both the child and mother actively focus together on objects and events, may shed insight into how interactions foster language and literacy (Adamson & Dimitrova, 2014). Thus, drawing inspiration from seminal theories of language development, we characterized general interactive features related to the dyad's shared focus, the structure of shared activities, and the flow and cohesiveness of the exchange. In addition, we described culturally specific features of joint engagement related to *respeto* (respect), a deeply held value of traditional Latino parenting (Calzada, Fernandez, & Cortes, 2010 , Tamis-LeMonda et al., 2020). The cultural value of respeto reflects the expectation of child deference and obedience to parent authority and is observed in Hispanic families of diverse ethnicities living in the United States (Bridges et al., 2012; Calzada et al., 2010; Guilamo-Ramos et al., 2007; Stein & Polo, 2014). Systematically observing these features of joint engagement allowed us to investigate how general and culturally specific aspects of early interactions may contribute together to subsequent language success.

Individual Contributions to Interactions as Predictors of Language and Early Literacy Success

There is a large literature that establishes that mothers' contributions to early interactions facilitate language learning (Adamson, Kaiser, et al., 2020; Pace et al., 2017). We investigated two complementary aspects of these contributions, one specific to mothers' language input and the second to the general quality of her sensitivity during interactions have recently received considerable attention (Cha & Goldenberg, 2015). Extensive research highlights that the quantity and quality of *language input* has long term implications for language and literacy development (Song et al., 2014; Weisleder & Fernald, 2013). Here, we measured the *number of different words* mothers produced, a measure of lexical diversity (Golberg et al., 2008) that indexes both the quantity and quality of language input during early interactions (Rowe, 2012).

Mothers' sensitivity in responding to their children's behavior and needs served as our second predictor of children's language and literacy outcomes. A sensitive parent is commonly described as one who is engaged with and responsive to the needs of the child (De Wolff & van Ijzendoorn, 1997). Parental sensitivity has been found to relate to immediate and long-term language, social, and cognitive development, and academic outcomes from preschool through the school years in numerous studies (Barnett et al., 2012; Mistry et al., 2010; Nordahl et al., 2020). Notably, these findings generalize across families from different cultural communities and socioeconomic strata (Dyer et al., 2014; Rodriguez & Tamis-LeMonda, 2011; Whiteside-Mansell et al., 2003), with core features of promptness and contingency predicting child outcomes across ethnic, racial, and socio-economic groups (Tamis-LeMonda et al., 2014).

In addition to predictors related to maternal behavior, we also considered how children's expressive language production during the interaction may account for language and early literacy outcomes. Although language skill measures often correlate strongly over time (Hoff, 2013), we know surprisingly little about how the quality of young children's' language production during an interaction predicts later language outcomes. Here, paralleling our measurement of the quantity and quality of maternal language input, we measured the *number of different words* the child produced to index the quality as well as the quantity of the child's verbal contribution to the interaction.

Dyadic Features of Joint Engagement as Additional Predictors of Language and Literacy

Although mothers' language input and sensitivity and child's language production during early interactions predict children's language and early literacy over time, effect sizes are often quite modest, indicating considerable unaccounted variation. Classical theories of symbol formation (Vygotsky, 1978; Werner & Kaplan, 1963) and contemporary social-interactional accounts of preverbal communication (Stern, 1977) and early language acquisition (Nelson, 2009) suggest dyadic features of *joint engagement*, the active sharing of objects and events during interactions, may facilitate early word learning in ways that heighten predictions of language and early literacy success.

Drawing on this literature, we measured three general features of joint engagement that may be especially conducive to early language development in typically developing children and young children at-risk for language delays (Adamson et al., 2019). *Symbol-infused joint engagement* describes how often and well toddlers sustain interaction when sharing objects and events with their mothers and attending to symbols including words and iconic gestures. Such episodes may optimize children's integration of words into ongoing activities (Adamson et al., 2004). *Routines and rituals* documents how often and well the child and mother use well-practiced shared formats to structure joint engagement. Predictable patterns such as pretending to share food or book reading may help young children situate words within interactions (Bruner, 1983). *Fluency and connectedness* characterizes the dynamics of the interaction in terms of its overarching flow and cohesion and the balance of initiations and responses between partners (Nelson, 2009; Stern, 1977). Recent research documents

how such general features of joint engagement may predict language outcomes (Adamson & Dimitrova, 2014) and how they may do so above the contributions of mothers' language input and sensitivity (Hirsh-Pasek et al., 2015). Here we extend this line of inquiry to document the dyadic features of communication of early mother-child interactions in Mexican-American immigrant families (Domenech Rodríguez, Donovick, & Crowley, 2009 ; Tamis- LeMonda et al., 2020) to examine how they predict both relatively short term outcomes and outcomes 5 years later when children are in early elementary school.

To characterize culturally specific manifestations of joint engagement, we also measured features of joint engagement related to the cultural value of *respeto*, which emphasizes children's obedience and deference towards elders and the loving behavior of parents as they guide their children (Bridges et al., 2012). Most studies of respeto rely on survey measures of parents' attitudes (Calzada et al., 2012). In contrast, we were interested in how dyads express respeto during early interactions and how respeto relates to general joint engagement features and child language and literacy outcomes. To this end, we measured expressions of respeto during mother-child interaction by assessing the two complementary culturally specific features that reflect the expression of respeto. *Parent's calm authority* characterized the degree to which a mother guided the interaction in an assertive and confident yet gentle manner and *child's affiliative obedience* described the degree to which the child demonstrated positive amenability to the mother's guidance (Tamis- LeMonda et al., 2020).

Current Study: Predicting Language and Early Literacy Success

Our primary aim was to determine whether individual differences in joint engagement during interactions among Mexican-immigrant mothers and their 2.5-year-old toddlers from low-income households predict children's language one year later and language and early literacy during early elementary school. We expected joint engagement at age 2.5 would be positively associated with children's expressive and receptive language one year later (Hypothesis 1). Moreover, we also anticipated that early joint engagement would predict receptive language and early reading skills in elementary school (Hypothesis 2).

Beyond documenting the relations between joint engagement and short- and long-term outcomes, we sought to unpack these associations in three ways. First, we probed associations among three general joint engagement features that provide complementary views of the focus, structure, and dynamics of interactions. We anticipated that these three features of joint engagement would be highly correlated (Hypothesis 3), with the fluency and connectedness of the interaction being the strongest correlate of children's outcomes (Hypothesis 4; see Hirsh-Pasek et al., 2015; Adamson et al., 2019)

Second, we asked if joint engagement would contribute uniquely to outcomes above measures derived from the mother-child interaction of maternal sensitivity, mother's lexical diversity (the number of different words used), and child's language production (the number of different words used). We expected these measures of individual partner's contributions to the interaction would predict later child measures but that joint engagement, which also captured specific language-facilitating aspects of the interactions, would account for additional unique variability in later child language and early literacy (Hypothesis 5).

Third, we asked if culturally specific features of joint engagement enhance predictions of language and early literacy outcomes based solely on general features of joint engagement (i.e *symbol infused joint engagement, fluency and connectedness, routines and rituals*). Our previous research (Tamis-LeMonda et al., 2020) showed that ratings of parent calm authority and child affiliative obedience during an interaction related strongly to mothers' language input and sensitivity during the interaction. Thus, we anticipated that ratings of respeto would also positively correlate with ratings of general features of joint engagement in ways that complement the focus, structure, and dynamics of shared activities (Hypothesis 6). However, given the dearth of previous studies (cf., Kim et al., 2018), we were uncertain how respeto would relate to language and literacy outcomes. One intriguing possibility is that given the cultural relevance of respeto, its inclusion would enhance the predictions of general features of joint engagement (Hypothesis 7).

Finally, in addition to confirmatory analyses for Hypotheses 1 through 7, we explored whether child sex moderates joint engagement, language and literacy outcomes, and the relation between joint engagement and outcomes. Previous reports suggest that girls often initially have larger expressive vocabulary than boys in several cultures (Eriksson et al., 2012) and sustain symbol-infused joint engagement more than boys do during parent-child interactions (Adamson et al., 2004; Hirsh-Pasek et al., 2015).

Method

Participants

The study sample was drawn from a longitudinal project of ethnic minority children and their families living in low-income households in the Dallas-Fort Worth metropolitan area. Recruitment eligibility for the larger project was based on reported income status (<200% of the federal poverty level) and ethnicity of the target child's parent (African American or Hispanic). Participants were enrolled between November 2009 and February 2011 when the target child was 2.5 years old and included 224 Hispanic mother-child dyads. Of these, 121 were included in the present investigation. Inclusionary criteria required that the mother had been born outside the United States, Spanish was the predominant spoken language at home, and at least 75% of total words produced by mothers and children during the interaction at 2.5 years be in Spanish. Because the vast majority (96%) of mothers born outside the United States in the larger study were born in Mexico, we excluded mothers not born in Mexico. Of the 224 Hispanic dyads in the parent study, 149 (66%) met the inclusion criteria. Of these, four were excluded because the child was subsequently diagnosed with a developmental disability, three were missing a video record of the interaction for technical reasons, two were excluded because 25% or more of the total words produced during the interaction at 2.5 years were in English, one because child age was subsequently found to have been misrepresented and was one year younger than initially reported, and 18 because the child lacked early-elementary outcome data.

Characteristics of the included 121 mother-child dyads are shown in Table 1. More than half of the mothers had less than a high school education, with almost a third having no more than an 8th grade education. Almost two-thirds of the families were living below 100% of

the federal poverty level. About two-thirds of the children were living in nuclear families, while another quarter were living with extended family.

Procedure

The current investigation focused on data collected at three time points: the enrollment visit (age 2.5), one year later, and during early elementary school. The average child age at the first visit was 2.51 years (95% CI = [2.51, 2.52], range = 2.4 – 2.6 years). At the second visit, children were on average 3.63 years of age (95% CI = [3.60, 3.66], range = 3.2 – 4.0), and at the early elementary visit, children were, on average, 7.34 years of age (95% CI = [7.29, 7.39], range = 6.5 – 8.1). At the third visit, 78% of the children were in first grade and 22% in second grade in 78 area schools, including 79% in public schools, 18% in charter schools, and 3% in private schools. As reported by the mother, most of the children's teachers (60%) used both Spanish and English in the classroom; 32% used only English, and 8% used only Spanish.

All data were collected during home visits that lasted 1.5 to 2 hours. Each visit was conducted by two Spanish-English bilingual research assistants. One research assistant interviewed the primary caregiver in Spanish, while the other conducted the child assessments.

During home visits, mothers and children participated in two play sessions that were adapted from the "3 Bags" procedure previously used in the NICHD Study of Early Child Care and Youth Development (SECCYD, NICHD ECCRN, 1999) and many other major longitudinal projects to document the relation between parent-child interaction and a variety of child outcomes (Fuligni & Brooks-Gunn, 2013; Mills-Koonce et al., 2015). This semi-structured procedure seeks to record mother-child play interactions that occur periodically in naturalistic settings rather than to generate a record of what a child typically experiences in such settings (Tamis-LeMonda et al., 2017). At the first visit, the activity included three bags and lasted approximately 15 minutes (M = 14.6 minutes; SD = 0.97 minutes). The toys and books were chosen to encourage interaction and imaginary play and to be gender neutral. Bag 1 included a wordless picture book titled *Good Dog, Carl* by Alexandra Day (1996). Bag 2 contained a toy stove with a skillet and spatula, toaster, oven, and salt/pepper shakers (Early Learning Centre's "First Kitchen"). Bag 3 contained a playhouse with family figures and a vehicle (Fisher Price's "Discovery Cottage"). At the second visit, two bags were used, and the interaction lasted approximately 12 minutes (M = 12.2 minutes, SD = 1.8 minutes). The first bag contained a game called "Pizza Guy" that involved balancing a pizza and "toppings" on the finger of a plastic chef. The second bag contained Duplo blocks and a laminated picture of a bug that could be created from different pieces.

Study protocols, entitled Quality of Early Mother-Child Communication and Language Outcome in Low-Income Hispanic Children, were approved by the [author institutions] institutional review boards, IRB numbers STUDY00003868, 17-20, and H17169, respectively.

Mother-Child Interaction Measures at the First Visit

Joint engagement ratings.—Five rating items were selected from the Joint Engagement Rating Inventory (JERI, Adamson, Bakeman, et al., 2020) that focus on dyadic qualities of the parent-child interaction. Each item is rated on a 7-point Likert scale that spans the range of possibilities observed within samples of typically developing toddlers (see Table 2).

Three of the items characterize general features of joint engagement. These items were adapted to ensure that culturally appropriate examples were included in the rating manual. *Symbol-infused joint engagement* characterizes the focus of the interaction by assessing how long and well the child sustains attention to both a shared object and symbols. Although the child's interest and attention ("engagement") is being characterized, the parent's contribution to the shared ("joint") topic is essential. Symbols include words and/or iconic gestures used expressively or receptively. For example, an episode of symbol-infused joint engagement occurs when the child produces a label ("baby") and a symbolic gesture (placing head on hands "sleep") as the mother puts a doll to bed. *Routines and rituals* rates how often and well the dyad enacts a familiar play routine (taking turns "seasoning" a toy fried egg) or a cultural script ("bed time"). *Fluency and connectedness* assesses the overarching flow and cohesion of communication. Raters attend to how partners balance control over the course of the exchange and how smoothly the interaction progresses.

In addition to these three general joint engagement items, two rating items captured aspects of the interaction that may have particular relevance in Mexican-origin families (authors reference). *Parent calm authority (PCA)* focuses on the parental side of the cultural value of *respeto* by noting the extent to which the mother used an assertive and confident yet gentle approach to guiding the interaction. The complementary rating of *child affiliative obedience (CAO)* captures the child's side of *respeto* by assessing how amenable the child was to the mother's guidance and direction.

Two trained Spanish-English bilingual raters of Mexican-origin each rated the interaction video records, one rating about two-thirds of the sessions and the second observer rating the rest. Training was done using videos that were from the same population as the study's sample. To assess reliability, a master observer also rated 25% of the sessions. Percentage agreement within one scale point for symbol-infused joint engagement, routines and rituals, fluency and connectedness, PCA, and CAO were 96%, 100%, 96%, 80%, and 84% for the first and 93%, 86%, 71%, 86% and 93% for the second observer, which indicates an estimated accuracy of 96%, 99%, 96%, 80%, and 83% for the first and 94%, 87%, 73%, 87%, and 94% for the second observer for the five rating items, respectively (Bakeman, 2018).

Maternal sensitivity rating.—As part of the project, all video-recorded interactions were rated using a set of standard global measures of parent and child behavior using a modification of scales developed as part of the NICHD Study of Early Child Care (Owen et al., 1996). The scales ranged from 1 (*not at all characteristic*) to 5 (*highly characteristic*). The maternal *sensitivity* rating coded by Spanish-English bilingual coders was used in the present study. A sensitive mother is defined as one "who is tuned in to the child, manifests awareness or attempts to understand the child's needs, moods, interests, and capabilities, and

allows this awareness and perspective to guide his/her interaction" (Owen et al, 2010, p. 2). Markers of maternal sensitivity include acknowledging the child's affect, contingent vocalization, good timing paced to the child's interest and arousal, and encouragement of the child's efforts. Inter-rater reliability based on an intraclass correlation coefficient was .85 for 28% of the interactions across the full sample of mothers that were double-coded.

Maternal language input.—The interactions were orthographically transcribed and coded using the Systematic Analysis of Language Transcripts (SALT 18) software (Miller & Iglesias, 2017). All transcribers had native to near-native oral and literate proficiency in Spanish and English. The transcription accounted for Spanish-influenced English, as recommended for bilingual language sample analysis (Rojas & Iglesias, 2015), including the proportion of code switching to English at the word level. Word-for-word transcription agreement across transcribers was based on a randomly selected sample of 25% of the transcripts and demonstrated a high degree of consistency (M = 98%; SD = 0.01%), calculated by dividing the total number of agreements by the sum of the total number of agreements and disagreements at the word level. As expected, mothers rarely code switched (M = 1.9%; SD = 0.31%). The *number of different words* (NDW) a mother used was calculated as the sum of all uninflected word roots and was used as an index of lexical diversity in language input (Golberg et al., 2008).

Child language production.—The number of different words (NDW) that the child produced during the interaction was calculated as the sum of all uninflected word roots. We used this measure to index the quantity and quality of the child's expressive language production during the interaction.

Child Language and Literacy Outcome Measures

The data archive did not contain a standardized assessment of expressive language that could be used to assess child expressive language skill at the second visit, one year after the first observation. Thus we used the number of different words (NDW) produced by the child in transcriptions of the mother-child interactions during the second visit to assess expressive language skill. Word-for-word transcription agreement across transcribers was based on a randomly selected sample of 25% of the transcripts and demonstrated high consistency (M = 97%; SD = 0.03%). Children rarely code switched at the word level (M = 4.3%; SD = 0.71%). Child receptive vocabulary was assessed using the *Test de Vocabulario en Imágenes Peabody* (TVIP, Dunn et al., 1986) or the *Peabody Picture Vocabulary Test* (PPVT, Dunn & Dunn, 1981). Six children were missing receptive language data at the second visit, one because the child missed the assessment and five due to administration issues.

In elementary school, when the children were 7.3 years old, their total acquired receptive vocabulary was assessed using the *Receptive One-Word Picture Vocabulary Test-Spanish-Bilingual Edition* (ROWPVT-SBE, Martin & Brownell, 2013), which is recommended when a child's household includes individuals who speak Spanish. Literacy skills were assessed either in English or Spanish based on the child's preferred language with the letter-word identification and word attack subscales of the *Woodcock-Johnson Third Edition–Revised* (Woodcock, 1990), or the *Bateria Woodcock-Muñoz* (Woodcock & Munoz-Sandoval, 1996),

which we collectively refer to as WJR. Performance on the two subscales were composited as a measure of literacy achievement in early elementary school (WJR reading) in either language.

Determining the language of administration for standardized assessments in a sample of Spanish-speaking young children with emerging English skills is a complicated issue, and most test makers offer little guidance. Because we were particularly interested in the association between early dyadic communication and children's success in acquiring language skills rather than in documenting proficiency in a specific language, our assessment strategy optimized child performance by matching the language of test administration to children's language preference. At the first home visit, all mothers reported that their child was speaking predominantly Spanish, and this was confirmed with the video-recorded interactions. The predominance of Spanish also occurred in the second visit when only a few of the mothers reported their child was speaking mostly English. For the PPVT administered at Time 2, 111 of the 115 children for whom we had data took the test in Spanish (the TVIP), while 4 took the test in English. However, by early elementary school, a larger proportion of the children were speaking English, although, as reported by the mother, a quarter of the children remained Spanish-dominant. Thus, the language of administration of the WJR was determined by the home visitor with input from the mother and child. The Spanish version was administered to 54% of the children. The standard administration protocol of the ROWPVT-SBE was followed, such that the assessment was primarily administered in one target language, but items with incorrect responses were subsequently re-administered in the non-target language.

Results

Descriptive statistics for the three general joint engagement items, the two culturally specific joint engagement items, the three assessments of individual contributions, and the four language and literacy outcome measures are presented in Table 3. The average rating on all joint engagement items and maternal sensitivity were close to the scale mid-point, indicating that these aspects of interaction were observed quite frequently. However, there was considerable variability in children's experience of joint engagement. Average receptive language was slightly below the assessment's population norm of 100 at 3.6 years (early childhood) but more than one standard deviation above the assessment's population mean of 100 at 7.3 years (early elementary). The next three sections address our specific research questions and hypotheses; thus, these analyses are confirmatory.

Question 1: Do General Features of Joint Engagement Predict Outcomes?

Correlations between variables are displayed in Table 4. Our first research question focused on associations between general features of joint engagement and language and early literacy outcomes. As expected, rating items assessing symbol-infused joint engagement, routines and rituals, and fluency and connectedness at 2.5 years of age were positively associated with children's expressive and receptive language skills (NDW and TVIP/PPVT) one year later (Hypothesis 1) and with receptive language and literacy skills (ROWPVT-SBE and WJR reading) in the early elementary school years (Hypothesis 2). Associations were

weak to moderate (thresholds for weak, moderate, and strong corelations are .10, .30, and .50 absolute; (.1–.3 and .3–.5 absolute, Cohen, 1988). The WJR was administered either in Spanish or in English, but the magnitude and significance level of the correlations reported in Table 4 were essentially the same when the WJR reading score was adjusted for the language of administration covariate.

Also as expected, the three ratings of general features of joint engagement were strongly or near strongly associated with one another (Hypothesis 3), $r = .49–.81$, $p < .001$ for all. However, unexpectedly, fluency and connectedness did not stand out as the strongest predictor of outcomes (Hypothesis 4). All three general joint engagement ratings were associated weakly to moderately with preschool and early elementary outcomes (see Table 4).

Question 2: Do General Features of Joint Engagement Heighten Predictions Based on Maternal and Child Contributions?

To test whether the general features of joint engagement accounted for unique variance in language and literacy outcomes, first above maternal sensitivity, second above maternal language input, and third above child language production (Hypothesis 5), we conducted regression analyses arranged hierarchically (as in Hirsh-Pasek et al., 2015). For this analysis, we averaged the ratings for symbol-infused joint engagement, routines and rituals, and fluency and connectedness ($\alpha = .83$). We then computed the proportion of variance accounted for by maternal sensitivity (step 1) and then the additional, unique variance accounted for when joint engagement was added to the model (step 2); likewise for maternal language input and child language production. Reversing the steps gave us the unique contributions of maternal sensitivity, of maternal language input, and of child language production; and subtracting the unique proportions from the variance accounted for by the two variables acting in concert gave us their overlap, as in a Venn diagram (Cohen & Cohen, 1983).

Results are presented in Figure 1. For all language and literacy outcomes, joint engagement accounted for weak to moderate and statistically significant increases in variance accounted for beyond maternal sensitivity, maternal language input, and child language production (thresholds for weak, moderate, and strong R^2 are .01, .09, and .25; (.1–.3 and .3–.5 absolute, Cohen, 1988) with one exception—joint engagement accounted for essentially no additional variance when child language production (NDW) at 2.5 years predicted child expressive language skill (NDW) at 3.6 years. (The dotted portions of the bars in Figure 1 indicate unique portions significant $p < .05$.) Percentages for early childhood expressive and receptive language and early elementary receptive language and reading, respectively, were 10%, 6.1%, 13%, and 7.2% for maternal sensitivity, 11%, 5.7%, 17%, and 7.5% for maternal language input, and 0.3%, 10%, 12%, and 6.5% for child language production.

Question 3: Do Culturally Specific Features of Joint Engagement Enhance Prediction?

As expected, our culturally specific rating items of parent calm authority (PCA) and child affiliative obedience (CAO) were strongly correlated (Hypothesis 6). Additionally, as shown in Table 4, the correlations of PCA and CAO with symbol-infused joint engagement were

moderate ($r = .35$ and .34, respectively) and with routines and rituals and fluency and connectedness were strong (r's ranging from .64 to .71).

Structural equation modeling utilizing *Mplus* (Muthen & Muthen, 1998) tested whether the amount of variance explained in child outcomes by general features of joint engagement was enhanced when including culturally specific features of joint engagement (PCA and CAO). Before fitting the structural model, measurement models were evaluated. For general joint engagement, a single factor model of the three rating items demonstrated strong model fit, $\chi^2(1) = 032$, $p = .57$, *CFI* = 1.00, *RMSEA* = .000, *SRMR* = .008.

For the culturally specific joint engagement latent variable, we used confirmatory factor analysis to assess a single factor, a two factor, and a bi-factor model to represent the five rating items. Single factor and two factor models are considered "simple structure" models because they require 1:1 correspondence between indicators and factors, achieved by using rotation to minimize cross-loadings or dropping items that load on more than one factor (Reise, 2012). In contrast, bi-factor models are complex factor structure models because they allow items to cross-load on more than one factor. In a bi-factor structure, all items typically load on one general factor and one or more distinct specific factors that represent residual clusters of common variance not captured by the general factor (Reise, 2012).

A bi-factor model in which all five rating items loaded on a general factor and the routines and rituals and two respeto items also loaded on a specific factor demonstrated excellent model fit, $\chi^2(3) = 4.06$, $p = .26$, *CFI* = .998, *RMSEA* = .054, *SRMR* = .025. A single factor model did not display as strong a fit as the bi-factor model, $\chi^2(6) = 113.60$, $p < .001$, *CFI* = .757, *RMSEA* = .383, *SRMR* = .104, nor did a two factor model with a simple structure of the three general joint engagement items loading on one factor and the two respeto items loading on a second factor, $\chi^2(5) = 27.73$, $p < .001$, *CFI* = .948, *RMSEA* = .194, *SRMR* = .057.

Next, two structural models were fit, regressing language and literacy outcomes in early childhood and early elementary school on the general joint engagement or the culturally specific joint engagement factor. The results for general joint engagement are displayed in the upper panel of Figure 2. Higher quality joint engagement was associated with better receptive language and expressive language one year later and subsequently better receptive language and literacy achievement.

The results for culturally specific joint engagement are displayed in the lower panel of Figure 2. Like the general joint engagement factor, the specific factor of the culturally specific joint engagement bi-factor latent variable positively related to receptive language in early elementary school. Unlike the general joint engagement bi-factor latent variable, the specific factor was not significantly related to early childhood receptive language or early elementary literacy achievement, and, unexpectedly, it was negatively related to expressive language one year later. This latter finding most likely reflects a suppression effect resulting from a statistical aberration (Sharpe & Roberts, 1997) given that the bivariate correlations between the two respeto items and expressive language were negligible (see Table 4).

To determine whether adding culturally specific aspects of joint engagement to a characterization of joint engagement significantly alters predictions of children's language and literacy development, we compared the amount of variance explained in children's outcomes as a function of general and culturally specific joint engagement (see Table 5). Both general and culturally specific joint engagement explained significant and similar proportions of variance in early elementary school language and literacy outcomes, and neither explained significant variance in early childhood receptive language. With regard to expressive language in early childhood, culturally specific joint engagement explained significant variance whereas general joint engagement did not. However, the confidence intervals around variance explained overlap, precluding us from concluding that the culturally specific joint engagement factor explained significantly more variance than did the general joint engagement factor (Hypothesis 7).

Exploratory Question about the Effect of Child Sex on Predictions

The girls' means for the three general joint engagement rating items—symbol-infused joint engagement, routines and rituals, and fluency and connectedness—were weakly higher, and significantly or nearly so, than the boys' means: 4.11 vs 3.47, 4.44 vs 3.98, and 4.67 vs. 4.25; Cohen's d = 0.42, 0.35, and 0.33; ps =.024, .060, and .070; respectively. (Thresholds for weak, moderate and strong ds are 0.20, 0.50, and 0.80; Cohen, 1988.) Means for PCA and CAO were weakly higher for girls than for boys but not significantly so: 4.26 vs. 3.94, 3.84 vs. 3.47; d = .0.22 and 0.25; ps = .22 and .17. In contrast, means for the four outcome variables differed little by children's sex, with effect sizes near zero: d = 0.03–0.08, p = .65–.88).

As an exploratory matter, we also asked whether associations between general joint engagement and outcome differed by sex. Generally, associations were higher for girls than boys, but significantly so only for routines and rituals with early elementary receptive language (r = .55 vs. .30, z = 1.70, p = .045 one-tailed) and for fluency and connectedness, again with early elementary receptive language (r = .57 and .24, z = 2.15, p = .016 one-tailed; cf. Research Question 1). However, the contribution of general joint engagement above maternal sensitivity and above maternal language input to the prediction of language and literacy outcomes (cf. Research Question 2) was primarily driven by girls. For the full sample, all portions of variance accounted for uniquely by joint engagement above these two maternal variables ranged from 5.7% to 17% and all were significant p < .01 (see Figure 1). However, for girls, joint engagement accounted for 14% to 33% of additional variance above these two maternal variables (p < .01 for all). In contrast, for boys, joint engagement accounted for 1.3% to 6.6% of additional variance above the two maternal variables (p < .05 for two of eight, but only = .040 and .046),

The contribution of general joint engagement above child language production to the prediction of language and literacy outcomes was more balanced between boys and girls. For the full sample, all portions of variance accounted for uniquely by joint engagement above child language production ranged from 6.5% to 12% and all were significant p < .01 (see Figure 1)—except for child language production predicting early child expressive language (i.e, child NDW at 2.5 years predicting child NDW at 3.6 years), which was near

zero (0.3%; 0.9% for girls and 0.2% for boys). Percentages for girls versus boys for general joint engagement above child language production were 8.2% versus 9.4% when predicting early childhood receptive language($p = .027$ and $.018$), 26% and 5.0% when predicting early elementary receptive language($p < .001$ and $.067$), and 5.9% and 5.9% when predicting reading ($p = .055$ and $.054$).

Finally, sex moderated only one of the associations between general and culturally specific joint engagement factors and the four outcomes (cf. Research Question 3). In a multiple group structural equation model stratified by child sex, the path coefficient from the general factor to early elementary receptive language was strong and significant for girls ($\beta = .484$, $p < .001$) but not for boys ($\beta = 161$, $p = .18$).

Discussion

This longitudinal study builds on growing evidence that the quantity and quality of communication during mother-toddler interaction predict children's subsequent language success (Pace et al., 2016). Ours is the first study to document the role of joint engagement in the language development of children from low-income Spanish-speaking immigrant Mexican households, a rapidly growing population (U.S. Census Bureau, 2013, December). Of particular note, we found that general features of joint engagement during play observed at age 2.5 predicted short- and longer-term outcomes, namely receptive and expressive language a year later and receptive language and early literacy skills five years later. Moreover, the language-facilitating effects of general features of joint engagement were still apparent even after the contributions of maternal language input, maternal sensitivity, and child language production during early interactions were considered, and when interactions were structured in ways consistent with the traditional cultural value of respeto.

Early Joint Engagement Uniquely Contributes to Language and Literacy Outcomes

The protracted and unique association between early joint engagement and long-term outcomes is consistent with the long-standing view that children's experiences during early interactions set the stage for future language development (Adamson et al., 2012; Bruner, 1983; Nelson, 2009). Here we focused on three general features of joint engagement—how dyads shared objects and symbols, how routines and rituals structured interactions, and how interactions flowed across turns—to gain a broad view of the quality of dyadic communication between 2.5-year-old children and their mothers.

As expected, ratings of these features were highly correlated, indicating that focus, structure, and dynamics of interactions are intertwined. Moreover, joint engagement varied considerably with some dyads often sustaining fluent, connected exchanges focused on shared objects and symbols during well-established routines and rituals, and other dyads did not.

Inspired by prior research (Hirsh-Pasek et al., 2015), we anticipated the rating of the flow of joint engagement might be a particularly strong predictor of language outcomes. However, we did not find it was a stronger predictor of the outcomes than ratings of symbol-infused joint engagement or routines and rituals. The small difference in age across studies may

explain these disparate findings. Children averaged 24 months in the Hirsh-Pasek et al. (2015) study versus 30 months in the current study. How joint engagement supports language acquisition may well change as symbol-infused joint engagement becomes increasingly more prevalent during this period (Adamson et al., 2004; Bottema-Beutel, 2016). Nonetheless, the lack of a single dominant feature emphasizes how a multi-faceted view of joint engagement may more fully capture how early interactions encourage language learning.

Most critically, as we expected general features of joint engagement substantially contributed to language outcomes both one and five years later even after considering the contributions of maternal lexical diversity and sensitivity and children's language production during the interaction. These findings underscore the importance of considering not only what the parent and the child offers during an exchange but also the quality of interactions that they co-construct for subsequent success in language acquisition.

The unanticipated finding that child sex moderated the unique contribution of joint engagement to language and literacy outcomes highlights the need to probe further how various aspects of the parent-child relationship may impact early language-facilitating interactions. Notably, although child outcomes did not differ by sex, when children were 2.5 years old mother-daughter dyads displayed significantly higher levels of symbol-infused joint engagement and elevated levels of routines and rituals and fluency and connectedness than did mother-son dyads. Moreover, child sex moderated the association between maternal language input and sensitivity at 2.5 years and language and literacy outcomes at 3.6 and 7.3 years. Thus, although the quality of joint engagement predicted outcomes for both mother-son and mother-daughter, it did so over and above the maternal language input and maternal sensitivity only for mother-daughter dyads. Whether this sex-related finding replicates and extends to interaction in a wider set of activities and with other interactive partners such as fathers remains an open, and intriguing, question.

Culturally Specific Joint Engagement Aligns with General Features of Joint Engagement

In addition to documenting general features of joint engagement, we measured culturally specific aspects of joint engagement to gain a broader picture of how Mexican-American mothers and their young children structure their interactions. Ratings of parent calm authority and child affiliative obedience were, as we expected, strongly correlated and, although on average ratings were near the middle of the item scale, varied considerably. Thus we observed dyads who rarely displayed respeto, such as a dyad in which the mother followed her daughter's direction as the girl told her mother what to do, and others in which both mother and child often displayed respeto, as when the mother clearly directed what she wanted the child to do while playing, and the child readily followed her directions, turning to the mother and smiling every time he did (authors reference). This observational approach to systematically observing manifestations of respeto provides a useful complement, especially for young children, to parent-report surveys about their attitudes about respect, in that they consider not only the control and obedience but also qualities of calmness in the mothers' directions and affiliative receptiveness in the children's response to them (Tamis-LeMonda et al., 2020).

Overall, patterns of culturally specific joint engagement aligned well with the language-facilitating general features of joint engagement. Two findings are particularly noteworthy. First, routines and rituals, a general joint engagement item, loaded along with the two respeto items onto the specific joint engagement factor. This suggests that respeto adds cultural specificity to the predictable shared structures of interaction that, as Bruner (1983) cogently argued, provide supportive scaffolds for early language acquisition.

Second, the level of culturally specific joint engagement did not alter predictions made by general features of joint engagement. The path coefficients from joint engagement to child expressive language one year later and later language and literacy outcomes were similar in models that did and did not include culturally specific indicators in the joint engagement latent construct. Intriguingly, our findings suggest that culturally specific ratings of joint engagement may have a facilitative effect, increasing the explained variance in our measure of expressive language outcome by almost 50% (from 8.3% variance associated with the general joint engagement factor to 12.2% explained variance for culturally specific joint engagement), although this differences was not statistically significant. Post-hoc power analyses indicated that culturally specific joint engagement would have to double the explained variance to be adequately powered with a sample size of 121 (Faul et al., 2009).

Limitations

Examining a longitudinal archive to address new research questions, even one as rare, rich, and extensive as the one used here (Caughy et al., 2017), is not without challenges. One of the limitations we faced was the lack of standardized assessments of the child's (Spanish) language, cognitive, and joint attention skills when the child was 2.5 years old. Thus, we could not determine the extent to which children's current skills explain variations in joint engagement experiences. Based on other studies with monolingual English-speaking samples that controlled for child vocabulary size (Masek et al., 2020) and joint attention skills (Adamson et al., 2019), we anticipate that skills differences alone do not explain the effect of variation in the quality of communication on outcomes, but future research is needed to confirm this occurs as well in samples of Spanish-English language learners.

Moreover, at times the outcome measures available were not ideal. In particular, our assessment of child expressive language skill at 3.6 years was a measure of lexical diversity, NDW, that was derived from observations that were not originally designed to maximize child language production. We were surprised that child expressive language related only weakly to early literacy in early elementary school, given robust relations between expressive language skills in early childhood and subsequent academic achievement found in other studies (Hoff, 2013). Moreover, we also used NDW at 2.5 years to measure the child's contribution to interactions—a use for which it is well suited. Thus, we were not surprised that child language production at 2.5 years was so strongly associated with child expressive language at 3.6 years that it precluded finding that joint engagement during interactions heightened the prediction of expressive language outcome. Administration of a standardized assessment of expressive language designed for dual language learnersl children (e.g., Bilingual English-Spanish Assessment; Peña et al., 2018) or a more structured elicitation approach that accounts for vocabulary knowledge in both English and Spanish

may have provide a more revealing independent outcome measure of child expressive language skill.

We are also aware that our assessments of language and early literacy in early elementary school did not allow us to probe specific questions related to English language development in children who are sequential Spanish to English learners. Our central interest focused on how the quality of earlier dyadic interactions experiences between children and their mothers predicts subsequent language and literacy achievement. As described earlier, Spanish was the dominant language during both the first (age 2.5) and second (age 3.6) home visits. However, by the third (age 7.3) visit, many children had become increasingly fluent in English, and we administered measures in a way that likely optimized children's performance either by, as in the case of the WJR, asking which language the child preferred, or, as in the ROWPVT-SBE, presenting some items in both languages. This optimization may explain the relatively high outcome scores, especially for receptive language for which 31% of the children scored above the 90th percentile, and thus may provide valuable information about variation in skills in our sample of Spanish-English language learners. It also reflects the critical need for using dynamic language and literacy assessments within a converging evidence framework that considers how children develop proficiency in two languages and how dual language skills change and grow over time (Castilla-Earls et al., 2020; Guzman- Orth et al., 2017). However, it does not allow us to examine the specific relation between joint engagement during interactions in Spanish and subsequent outcomes in Spanish or English.

Also, although the archive does not include extensive information about children's language experiences during the transition to formal education, the language spoken by their teachers at the time of our third visit was heterogeneous, with the majority of children not yet having shifted into academic instruction in English. Thus, although children in our sample shared strong commonalities in their early home language, SES, ethnicity, and mother's immigration status, over time they may have experienced different supports for their early literacy skills that may have differentially impacted their reading scores depending on the language of assessment. Exploring this possibility is beyond the scope of the current study and archival data, but noting it here underscores the complexity of documenting potentially important aspects of children's expanding ecological system as they enter school.

Finally, because our sample was limited to mothers and their children of Mexican-origin, from low-income households, it is not possible to generalize the findings to more diverse Hispanic families of other ethnic origins and other socioeconomic conditions living in the United States. However, there is evidence that the cultural value of respeto is found across Hispanic populations including Mexican-Americans, Puerto Ricans, and Dominican-Americans (Bridges et al., 2012; Calzada et al., 2010; Guilamo-Ramos et al., 2007; Stein & Polo, 2014). Future research should examine whether the observable manifestations of respeto in the form of parent calm authority and child affiliative obedience are evident in the interactions of the mothers and their young children in diverse Hispanic populations. Likewise, parents of other ethnic minority groups, such as African Americans, place high value on respect for elders (Hurd et al., 1995; Nobles, 1988), and future research should

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extend this observational work to those populations as well. Finally, this work would benefit from an extension to non-maternal caregivers such as fathers and grandparents.

Conclusion

This study confirmed that the quality of early mother-toddler communication predicts children's language and early literacy success both one and five years later in a sample of Mexican-immigrant dyads who may face daunting resource challenges. Our findings highlight the importance of a strong communication foundation for early language success in Spanish-speaking children who are learning English as a second language, a relation that was previously documented in young monolingual English-speaking toddlers from low-income families (Hirsh-Pasek et al., 2016). Notably, the associations between joint engagement and outcomes endured into the early elementary years, suggesting that high quality early interactions in Spanish may significantly impact children's later academic success both in Spanish and English. Finally, early interactions infused with parents' language and cultural practices can provide a nurturing context for language and literacy success.

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Highlights

- Quality of mother-toddler communication predicts language and literacy one and five years later.

- Measures of joint engagement strengthen predictions made by maternal and child contributions alone.

- *Respeto* in Mexican-American dyads aligns with joint engagement to predict language and literacy.
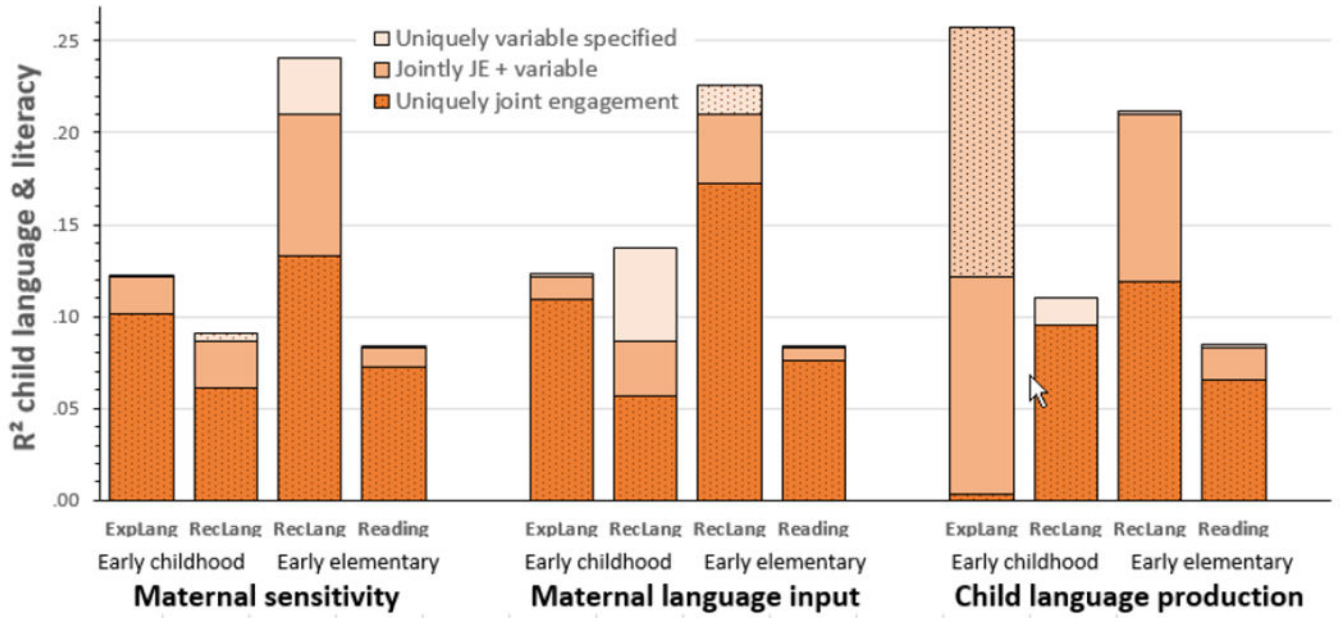
Figure 1.
The figure shows how child language and literacy outcome variance—variance for expressive and receptive language at 3.6 years (ExpLang and RecLang) and receptive language and reading at 7.3 years—is apportioned between predictor variables (maternal sensitivity, maternal language input, and child language production at 2.5 years). The height of each bar indicates the amount of variance accounted for by a particular two-predictor model (total R^2). Each bar is divided into three parts. The bottom part represents the portion of total R^2 uniquely accounted for by joint engagement, the top part represents the portion of total R^2 uniquely accounted for by the predictor variable specified, and the middle part indicates the portion of total R^2 accounted for by the overlap between the two variables. Thus the bottom and middle portions together represent the total amount of variance accounted for by joint engagement. Unique portions significant $p < .05$ are dotted. $N = 121$ except 120 and 115 for early childhood expressive and receptive language, respectively.
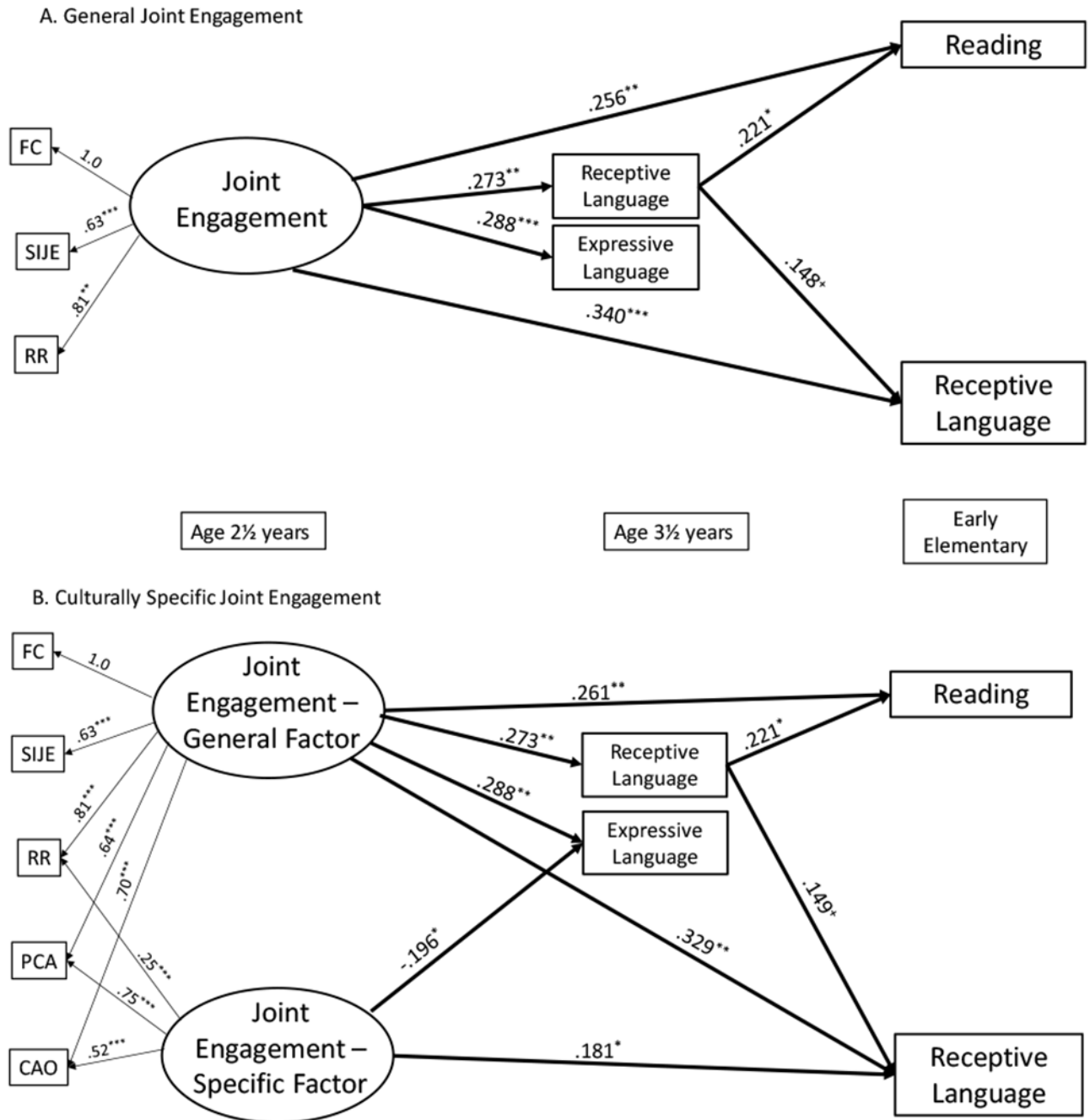
Figure 2.
Direct and indirect effects of general joint engagement (Panel A) and culturally specific joint engagement (Panel B) on child language and literacy outcomes in early elementary school as mediated by child language in early childhood. Only significant paths are shown, and all coefficients are standardized. Model fit for general joint engagement: $\chi^2 (9) = 20.80$, $p = .014$, CFI = .954, RMSEA = .10, SRMR = .046. Model fit for culturally specific joint engagement: $\chi^2 (15) = 25.67$, $p = .042$, CFI = .979, RMSEA = .08, SRMR = .041. FC = fluency and connectedness, SIJE = symbol-infused joint engagement, RR = routines and

rituals, PCA = parent calm authority, CAO = child affiliative obedience $*p < .05$, $**p < .01$, $***p < .001$

Table 1

Sample Characteristics

Variable	N	%
Child		
Male	64	53
First born	20	17
Caregiver education		
8th grade or less	34	28
Less than 12th grade	35	29
High school diploma	32	26
Post high school	18	15
College	2	1.7
Maternal age		
<20 years	4	3.3
20–29 years	56	46
30–39 years	51	42
40 or more years	10	8.3
Family poverty level		
<50% federal poverty level (FPL)	4	3.3
50–99% FPL	75	62
100–149% FPL	33	27
150% FPL or more	9	7.4
Family structure		
Nuclear	81	67
Nuclear extended	31	26
Single parent	5	4.1
Non-nuclear	4	3.3

Note. $N = 121$.

Table 2

Joint Engagement Rating Items

Rating Item	Definition	Anchors		
		1=	4=	7=
Child's symbol-infused joint engagement	The child is both in a state of joint engagement and actively using symbols (words, iconic gestures, signs), producing symbols and/or demonstrating receptive symbol use.	No episodes of the symbol-infused joint engagement state	Spends about a third of the scene in symbol-infused joint engagement that is of moderate quality, briefly in symbol-infused joint engagement that is of notably high quality	Frequently in rich and varied episodes of symbol-infused joint engagement
Routines and rituals	The frequency and quality of routines and rituals that occur during shared activities.	No evidence of shared scripts	Some but not sustained or permeated	Sustained, varied, and nuanced
Fluency and connectedness	The overarching flow and cohesion of the interaction including the balance between partners' initiations and responses, the negotiation of turn taking, and the fluidity of the interaction.	No interaction is established	Interaction lacks smoothness, appears to be largely dominated by one partner	Fluid and balanced interaction that is often sustained
Parent calm authority	The extent to which the mother influences the direction of the interaction by using an assertive and confident yet gentle approach.	No use of gently firm direction	Intermittent use of kind, confidant guidance	Consistently calm, clear, firm, direct
Child affiliative obedience	The degree of amenability the child demonstrates in response to the mother's guidance and direction.	Does not follow parent direction	Intermittent pleasing and deference	Continual respect and deference to parent

Table 3

Descriptive Statistics

Variable	Age (yrs)	*M*	95% CI	Range
General joint engagement items				
Symbol-infused joint engagement (1–7)	2.5	3.77	[3.5, 4.0]	2–7
Routines and rituals (1–7)	2.5	4.20	[4.0, 4.4]	2–7
Fluency and connectedness (1–7)	2.5	4.45	[4.2, 4.7]	1–7
Culturally specific joint engagement items				
Parent calm authority (1–7)	2.5	4.09	[3.8, 4.4]	2–7
Child affiliative obedience (1–7)	2.5	3.64	[3.4, 3.9]	1–7
Individual contributions				
Maternal sensitivity (1–5)	2.5	3.36	[3.2, 3.5]	2–5
Maternal language input (NDW)	2.5	196	[187, 204]	79–336
Child language production (NDW)	2.5	52	[47, 56]	9–107
Language and literacy outcomes				
Early childhood expressive language (NDW)	3.6	63	[58, 67]	1–140
Early childhood receptive language (TVIP/PPVT)[a]	3.6	91	[89, 93]	65–127
Early elementary receptive language (ROWPVT-SBE)	7.3	118	[115, 120]	90–146
Early elementary reading (WJR reading)	7.3	493	[485, 500]	384–577

Note. *N* = 121, except 120 and 115 for early childhood expressive and receptive language. Age = children's mean age in years at the time of the assessment; CI = confidence interval; NDW = number of different words; TVIP = Test de Vocabulario en Imágenes Peabody (Dunn, Padilla, Lugo, & Dunn, 1986); PPVT = Peabody Picture Vocabulary Test (Dunn & Dunn, 1981); ROWPVT-SBE = Receptive One-Word Picture Vocabulary Test-Spanish-Bilingual Edition (Brownell, 2001); WJ = Woodcock-Johnson (Woodcock, 1990; Woodcock & Muñoz-Sandoval, 1996).

[a] *n* = 111 for TVIP and 4 for PPVT

Table 4

Correlations

Variable	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.
1. Symbol-infused joint engagement	—										
2. Routines and rituals	.49**	—									
3. Fluency and connectedness	.63**	.81**	—								
4. Parent calm authority	.35**	.71**	.64**	—							
5. Child affiliative obedience	.34**	.70**	.70**	.84**	—						
6. Maternal sensitivity	.26**	.32**	.36**	.31**	.30**	—					
7. Maternal language input	.03	.33**	.31**	.27**	.25**	.20*					
8. Child language production	.67**	.41**	.46**	.21*	.14	.27**	.18*				
9. Early childhood expressive language	.37**	.24**	.29**	.04	.05	.14	.12	.50**			
10. Early childhood receptive language	.18	.33**	.26**	.16	.19*	.17	.28**	.17	.15	—	
11. Early elementary receptive language	.38**	.41**	.40**	.38**	.33**	.33**	.23*	.33**	.21*	.25**	—
12. Early elementary reading	.21*	.24**	.32**	.13	.20*	.10	.08	.10	.11	.28**	.17

Note. $N = 121$, except 120 and 115 for early childhood expressive and receptive language.

*
$p < 05$,

**
$p < .01$

Table 5

Variance Explained in Child Language and Literacy Outcomes Related to General and Culturally Specific Joint Engagement.

Variable	General joint engagement				Culturally specific joint engagement			
	R^2	$SE(R^2)$	95% CI	t	R^2	$SE(R^2)$	95% CI	t
Early childhood expressive language	.083	.048	[.000, .177]	1.72[†]	.122	.057	[.010, .234]	2.12[*]
Early childhood receptive language	.074	.047	[.000, .166]	1.57	.075	.048	[.000, .169]	1.57
Early elementary receptive language	.192	.065	[.065, .319]	2.97[**]	.223	.067	[.092, .354]	3.12[**]
Early elementary reading	.147	.060	[.029, .265]	2.43[*]	.155	.061	[.035, .274]	2.52[*]

Note. N = 121, except 120 and 115 for early childhood expressive and receptive language.

[†] p < .10,

[*] p < .05,

[**] p < .01