Influences of Latino Caregivers’ Input and Acculturation on Children’s Bilingual Development: A Speech Sample Analysis

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LOYOLA UNIVERSITY CHICAGO

INFLUENCES OF LATINO CAREGIVERS’ INPUT AND ACCULTURATION ON CHILDREN’S BILINGUAL DEVELOPMENT: A SPEECH SAMPLE ANALYSIS

A THESIS SUBMITTED TO
THE FACULTY OF THE GRADUATE SCHOOL
IN CANDIDACY FOR THE DEGREE OF
MASTER OF ARTS

PROGRAM IN DEVELOPMENTAL PSYCHOLOGY

BY
JORDAN SIERRA PERRY
CHICAGO, IL
MAY 2022
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ABSTRACT

Interactions with caregivers are important for children’s development. In particular, the language input that young dual language learners (DLLs) receive from their primary caregivers affects their cultural knowledge and their bilingual language outcomes. However, relatively little research has been conducted to investigate the cultural contexts that influence Latino caregivers’ bilingual language use at home, including their acculturation level. Thus, the present study examined the relation between caregivers’ acculturation and their children’s bilingual (Spanish and English) language use, and whether this relation varied as a function of caregivers’ bilingual language use. Parent-report measures of bilingual language use, in addition to video recordings of caregiver-child interactions during a 10-minute play task, were collected from caregiver-child dyads (N=37) when the children were 18 (M<sub>age</sub>=18.73 months; SD<sub>age</sub>=1.11) and 24 (M<sub>age</sub>=25.13 months; SD<sub>age</sub>=1.29) months of age. A measure of caregivers’ acculturation was also collected. Descriptive analyses revealed that strongly heritage culture-oriented caregivers and their children used the most Spanish at 18- and 24-months, respectively, as measured by the number of word tokens in Spanish and English from transcribed video recordings. Caregivers who were more heritage culture-oriented also reported using more Spanish with their children. Regression and mediational analyses revealed that caregivers’ acculturation level was related to children’s bilingual language use, as a function of caregivers’ bilingual language use from six months prior, following the same pattern seen in the descriptive analyses. This relation was found when a multidimensional conceptualization of acculturation was used as the predictor, not just its
language or sociocultural domains.

Keywords: acculturation, bilingual language use, language input, caregiver-child interaction, dual language learners, mediation
INTRODUCTION

Very young children are exposed to and learn language primarily at home, for example, from their caregivers (Lewis et al., 2016). Caregivers’ language use plays a particularly important role in language learning for the 23% of U.S. children who are Latino Dual Language Learners (DLLs\(^1\); individuals learning more than one language at once; Espinosa, 2013; National KIDS COUNT, 2019). In particular, while Latino DLLs will necessarily gain exposure to English at school, their exposure to the non-dominant language in the larger community (i.e., Spanish) may only be derived from caregivers in the home (Arriagada, 2005; López et al., 2020). For some Latino families, maintaining access to both of their languages better ensures their children’s bilingual learning, while for others, maintaining access to the non-dominant language may be challenging (López et al., 2020). Despite the continued high rates of immigration to the United States from Latin American countries (American Community Survey, 2018; Budiman et al., 2020), relatively little is known about the unique and interrelated cultural contexts that influence Latino caregivers’ bilingual language use at home, including the extent to which caregivers adapt to another culture after prolonged contact (i.e., acculturation; Cabassa, 2003; Cote & Bornstein, 2014). Thus, this study examines the direct and indirect relations among (1) children’s bilingual (Spanish and English) language use, (2) their caregivers’ bilingual language use, and (3) factors influencing language use at home, including caregivers’ acculturation level.

\(^1\) The acronym DLL is used to refer to children learning two languages at the same time (Espinosa, 2013). Some scholars may refer to these learners as English Language Learners (ELLs), particularly in educational settings or when they are older than three years of age (Espinosa & García, 2012), as there is not yet agreement on one standard definition or acronym for individuals who are learning more than one language concurrently.
Theoretical Perspectives

As children’s individual experiences are shaped by their various social contexts (Bronfenbrenner, 1979; Hoff, 2006), including the family and community contexts, this study relating children’s bilingual language learning to their caregivers’ acculturation and language use is guided by the Integrative Model of Child Development (García Coll et al., 1996). This model describes unique conditions and developmental pathways for children of color in the United States that are born out of processes of social stratification. In particular, the García Coll and colleagues (1996) posit that families, especially those who are bilingual or bicultural, may form their own adaptive culture within a dominant culture. An adaptive culture is described as a social system defined by goals, values, and attitudes that differ from the dominant culture (García Coll et al., 1996). Typically, an adaptive culture contains elements from one’s heritage culture and the dominant culture, and is influenced by current contextual demands and historical forces. Therefore, children in adaptive cultures can be considered bicultural, as they are members of more than one cultural group (Fuller & García Coll, 2010; García Coll et al., 1996). Minority parents in bicultural homes must also decide which parenting values, attitudes, and practices from their heritage culture they want to retain and which they want to relinquish in favor of the dominant culture’s ideals, for example, language (García Coll et al., 1996). Consequently, forming an adaptive culture influences family structure and values, child characteristics, and children’s developmental competencies, such as social and linguistic skills.

When a caregiver adapts to and borrows traits from another culture after prolonged contact, it is commonly referred to as acculturation (Page, 2006). Acculturation is a complex and multifaceted concept that underlies the formation of adaptive cultures (García Coll et al., 1996). Indeed, Cabassa (2003) explains that in contrast to a unidimensional concept of acculturation,
where an individual loses adherence to their heritage culture as they adjust to the dominant culture (Cuéllar et al., 1980), acculturation is a bidimensional or multidimensional concept, where each dimension of acculturation conceptually represents one’s adherence to each of their cultures (Zea et al., 2003). Furthermore, within an adaptive culture, a person’s dietary intake, popular media preferences, social affiliation preferences, cultural values and attitudes, and cultural identity are some important indicators of both the conscious and unconscious components of the process of acculturation, as well as one’s integration of their new and old cultures (Cuéllar et al., 1995; Marin & Gamba, 1996; Page, 2006; Schwartz et al., 2010; Zea et al., 2003). The domain of language is chief among the cultural practices that are nested under the umbrella term of acculturation (Schwartz et al., 2010).

Indeed, the Integrative Model of Child Development (Garcia Coll et al., 1996) suggests that family values, beliefs, and goals, including those about one’s heritage language, influence the behaviors that are displayed within family interactions. In fact, children gain sociocultural knowledge through language exposure and interaction (Vygotsky, 1978). By interacting with their caregivers during daily activities and routines, children acquire the social skills, tools, and language needed to participate in society (Fuller & Garcia Coll, 2010; Garcia, 1983; Vygotsky, 1978). Moreover, in bicultural families, socialization goals and parenting practices are often derived from one’s heritage culture (Fuller & Garcia Coll, 2010; Greenfield, 2009). Therefore, it is important to account for the influence of caregivers’ level of acculturation on children’s language development, as different adaptive cultures may lead to variations in terms of

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2 Compared to the unidimensional framework, the bidimensional or multidimensional framework of acculturation seems to draw more empirical support (Kang, 2006; Ryder et al., 2000; Thomson & Hoffman-Goetz, 2009), as it is thought to better represent the realities of the process of acculturation (Berry & Sam, 1996; Rogler et al., 1991).
caregiver-child interactions within home language environments, including bilingual language exposure, and thus, child outcomes (García Coll et al., 1996).

**Acculturation and Child Language Outcomes**

There are a few published studies that have identified relations between caregiver acculturation and children’s bilingual language outcomes. For example, Boyce et al. (2013) found that self-reported maternal levels of acculturation were related to children’s productive vocabulary knowledge in English and Spanish, as assessed using vocabulary checklists completed by caregivers when children were 24 months of age. In that study, caregivers’ acculturation behaviors, including language use and media preferences in English and Spanish, were measured. Specifically, the researchers found that children of more English-oriented mothers had higher total productive vocabularies. Boyce et al. (2013) suggest that their findings may reflect that US-oriented mothers may emphasize oral and written language skills in the home before their children receive formal instruction, in turn affecting their children’s bilingual language outcomes.

In another study, which focused on a sample of immigrant families in the United States, Cote and Bornstein (2014) found that maternal acculturation was related to children’s productive vocabulary size in English, with a maternal estimate of English exposure percentage as a partial mediator. In that study, acculturation was measured as behaviors, attitudes, and cultural identity. Children’s vocabulary size was assessed with caregiver-reported checklists of productive vocabulary. These researchers found that mothers who had a higher degree of US-acculturation tended to speak to their children more in English, leading their children to produce more English vocabulary. They also found that maternal acculturation was related to children’s vocabulary size in their heritage language, with the percent of heritage language exposure as a full mediator.
Overall, this study concluded that mothers who were more acculturated to their heritage society were more likely to expose their child to input in their heritage language, leading their children to develop a larger heritage language vocabulary.

In a recent study, Troesch et al. (2021) analyzed the direct and indirect effects of parental acculturation attitudes on children’s second language skills, as assessed with standardized language assessments. This study differs from prior studies of caregiver acculturation because caregivers’ attitudes about acculturation, rather than their overall acculturation level (i.e., Boyce et al., 2013; Cote & Bornstein, 2014), predicted caregivers’ second language proficiency and children’s second language skills. In their sample of bilingual children from an immigrant background, these researchers found that self-reported parental second language proficiency mediated the significant relationship between parental acculturation attitudes and children’s second language skills. That is, caregivers’ increasingly positive attitudes toward the host country were associated with greater second language proficiency in caregivers and second language skills in children. The time the children spent in second language-dominant childcare outside of the family was not a significant mediator for this relationship, though it still predicted children’s second language skills. Thus, these findings may suggest that the home environment, and particularly caregiver language input, may be the key context for the influence of acculturation on young children’s language outcomes, especially in bilingual families with immigrant caregivers.

Taken together, the findings of these studies emphasize that variability in caregivers’ levels of acculturation is related to their own language tendencies, and subsequently children’s language outcomes (Boyce et al., 2013; Cote & Bornstein, 2014; Troesch et al., 2021). This relation was found when researchers assessed caregivers’ language use (Boyce et al., 2013; Cote
& Bornstein, 2014) and caregivers’ language proficiency (Troesch et al., 2021). In particular, the findings by Boyce et al. (2013) and Cote and Bornstein (2014) suggest that caregivers’ acculturation is associated with children’s bilingual language use, as a function of caregivers’ bilingual language use. Still, these studies primarily relied on parent-reported measures of language use. Therefore, the present study will add to this literature-base, as it will utilize spontaneous speech samples to further investigate the relation between caregivers’ acculturation and children’s bilingual language learning.

**Caregiver Language Use and Child Language Development**

Through their patterns of language use, caregivers are likely to transmit cultural values to their children (Arriagada, 2005; Ramírez-Esparza et al., 2017) and shape their children’s language experiences (De Houwer, 2007; Hammer et al., 2009; Hammer et al., 2012; Hoff, 2006; Lewis et al., 2016). In turn, differences in caregivers’ language use may influence the extent of bilingualism reached by young DLLs (De Houwer, 2011). For example, different patterns of language input may lead simultaneous bilinguals (i.e., DLLs learning multiple languages from birth; De Houwer, 1990; Amengual, 2019) to be more skilled in one of their languages than the other (Ramírez-Esparza et al., 2017). Indeed, the relative amounts of exposure to each language have been shown to predict the developmental trajectories of each language (Bohman et al., 2010; De Houwer, 2011). Specifically, a substantial literature-base – albeit with English monolinguals – reveals a positive effect of the quantity of input in one language (i.e., the amount of time or percent of language exposure) on a child’s corresponding language development (Hart & Risley, 1995; Huttenlocher et al., 1991; Huttenlocher et al., 2010; Rowe & Snow, 2019).

It is worth noting, however, that this finding relating caregivers’ language input to children’s language use typically comes from studies that utilize parent-report measures in the
bilingual literature (Hoff et al., 2012; Lewis et al., 2016; Pearson et al., 1997). Given the large resources required for studies utilizing spontaneous speech samples (see Huttenlocher et al., 2010; Marchman et al., 2017), the majority of studies rely on parent-report estimates of language use and caregiver-completed checklists of children’s vocabulary. For example, in a sample of bilingual children, Pearson et al. (1997) found a strong, significant correlation between percent of input in a language and children’s vocabulary knowledge in that same language. Children’s productive vocabulary knowledge was assessed using checklists completed by children’s caregivers.

Similarly, Hoff et al. (2012) found that bilingual children in homes with more English exposure developed stronger English vocabulary skills, while bilingual children in homes with more Spanish exposure developed stronger Spanish vocabulary skills. In that study, daily diaries were used to assess home language exposure, and English and Spanish productive vocabulary checklists were used to assess children’s vocabulary skills. Both the daily diaries and the checklists were completed by caregivers.

Moreover, Hammer et al. (2009) found that maternal usage of Spanish maximized children’s vocabulary development in Spanish, while maternal usage of English slowed children’s vocabulary development in Spanish. Maternal usage of both Spanish and English were assessed using a language use questionnaire completed by mothers. Children’s vocabulary development was assessed using standardized receptive language assessments. Overall, in the bilingual literature, there is substantial evidence from studies utilizing parent-report measures that the amount of language children receive in each language from their caregivers corresponds to the amount of language children will use in each language (De Houwer, 2011; Hammer et al., 2009).
Spontaneous Speech Samples and Parent-Report Measures

As previously mentioned, research suggesting that caregiver acculturation predicts children’s language skills by way of caregivers’ bilingual language use or proficiency (Boyce et al., 2013; Cote & Bornstein, 2014; Troesch et al., 2021) has also relied on parent-report measures of caregivers’ and children’s language use. For example, despite evidence to suggest that caregivers who are more US-oriented, as classified using the ARSMA-II, use less Spanish (Martinez et al., 2018), caregivers’ language behaviors have not typically been documented as their actual language use (i.e., using spontaneous speech samples). Given that measures of spontaneous language have been shown to capture more variability in bilingual language environments than parent-report measures do (Marchman et al., 2017), utilizing spontaneous speech samples may prove to be a more reliable indicator when studying acculturation behaviors, such as language use. That is, while parent-report measures of language use may indeed be influenced by one’s acculturation attitudes, spontaneous language samples may better reflect caregivers and children’s actual language behaviors. Moreover, spontaneous language collected from structured tasks (e.g., the Three Bags Task; Brady-Smith et al., 1999) tends to be more consistently child-directed and dense (i.e., fewer fluctuations between speech and silence; Tamis-LeMonda et al., 2017), and as such, may provide a better measure of language use when the influence of only one caregiver’s acculturation is in question.

Therefore, as contextual and cultural differences may affect bilingual language use in Latino and bicultural households in the United States (García Coll et al., 1996; Hoff & Core, 2013), it is important for research to examine the effects of caregiver acculturation on children’s bilingual language use as a function of caregivers’ actual, and not only, self-reported language use. By examining the full pathway relating caregivers’ acculturation to children’s language use,
researchers may expand upon findings supporting that children’s cultural backgrounds and socialization influence their early development. In particular, caregivers’ acculturation may affect young DLLs’ bilingual language outcomes, as adaptive cultures formed within the bicultural home (García Coll et al., 1996) and differences in caregivers’ bilingual language input (De Houwer, 2007) may affect children’s developmental and linguistic outcomes.

**Conceptualizations of Language in Relation to Acculturation**

While language is included in most, if not all, descriptions and measures of acculturation (Thomson & Hoffman-Goetz, 2009), there are different approaches to how the domain of language is conceptualized as it relates to acculturation (Kang, 2006). We have identified at least three approaches to measuring language in relation to acculturation. First, language use is a common measure of language as it relates to acculturation. In general, it is thought that the more one uses English, the more oriented they are to the US, and the more one uses their heritage language, the more oriented they are to their heritage culture. Thus, questions about language use, where respondents rate how frequently they use each language, are common on acculturation measures (Kang, 2006). On these measures, respondents rate how often they speak, write, and read in each language (Cuéllar et al., 1995). According to Kang (2006), some acculturation measures solely include questions that are worded to assess frequency of language use, rather than including any questions related to language proficiency.

Second, assessing one’s language proficiency, or how well they speak a language, is another way to measure language as it relates to acculturation. When language proficiency questions are included on acculturation measures, it is assumed that high proficiency in English indicates high levels of US-orientation, whereas high proficiency in one’s heritage language indicates high levels of heritage culture-orientation. According to Kang (2006), some researchers
who value the dimension of language proficiency have chosen to assess language use and proficiency concurrently (Berry et al., 1987; Birman, 1994), believing that this conceptualization better represents the linguistic dimension of acculturation. However, Kang (2006) highlights that including questions about language in both frequency and proficiency formats on an acculturation measure may pose a potential problem, as conceptual independence of the questions may not be guaranteed. It may also be disadvantageous to use a measure that includes language proficiency questions rather than language use questions, as frequency questions have been found to be more conceptually independent than proficiency questions (Kang, 2006).

Finally, language may be used as a proxy measure for acculturation. That is, as the language domain has been found to explain most of the measured variance in acculturation (Coronado et al., 2005; Cuéllar et al., 1980; Thomson & Hoffman-Goetz, 2009), some researchers have used language as the sole proxy measure for acculturation (Lee et al., 2011; Marsiglia et al., 2011). In these cases, more English use or proficiency tends to represent that a person has higher levels of US-acculturation (Lee et al., 2011). In particular, language has been used often in public health studies to convey the effects that acculturation may have on access to health care and substance abuse in ethnic minority youth and families in the United States (Lee et al., 2011; Marsiglia et al., 2011). In these cases, increased US-acculturation has been found to predict to declining health outcomes, following what is known as the “immigrant paradox” (Winsler et al., 2014). However, by only using language to approximate acculturation, researchers limit their scope of the concept of acculturation, as other dimensions of acculturation are omitted (Schwartz et al., 2010; Thomson & Hoffman-Goetz, 2009). Thus, rather than only using language as a proxy measure, using more robust assessments of acculturation may account
for more contextual factors, better representing the complex, multidimensional concept of acculturation (Cabassa, 2003).

**Present Study**

As children’s language development may be affected by the quantity of input they receive in each language (Hoff et al., 2012; Pearson et al., 1997), in addition to cultural processes, including acculturation (Boyce et al., 2013; Cote & Bornstein, 2014; García Coll et al., 1996; Troesch et al., 2021), the present study examined the relation between caregivers’ acculturation level and children’s bilingual language use, as a function of caregivers’ bilingual language use, in the home language environment. Notably, Latino caregivers’ bilingual (Spanish and English) language use was assessed with both parent-report measures and spontaneous speech samples. Children’s bilingual language use was also assessed using spontaneous speech samples. Additionally, the present study examined caregivers’ acculturation level using a robust measure to capture the complexity of acculturation (Cuéllar et al., 1995). The guiding research question for this study was as follows: *What is the relation of caregivers’ acculturation level to their children’s bilingual language use, and does this relation vary as a function of caregivers’ bilingual language use?*

We hypothesized that, in Spanish-English bilingual homes, children of caregivers who are more heritage culture-oriented would use more word tokens in Spanish than in English, whereas children of caregivers who are more US-oriented would use more word tokens in English than in Spanish. In particular, and as guided by previous study findings that caregivers’ acculturation is associated with children’s bilingual language skills (Boyce et al., 2013; Cote & Bornstein, 2014; Troesch et al., 2021), we expected caregivers who are more heritage culture-oriented to use more Spanish with their children at 18 months of age. We then expected that,
consequently, this would lead their children to use more Spanish at 24 months of age. On the other hand, we hypothesized that caregivers who are more US-oriented would use more English with their children at 18 months of age, leading their children to also use more English at 24 months of age.

Guided by previous study findings that caregivers’ acculturation level is related to their self-reported bilingual language use (Boyce et al., 2013; Cote and Bornstein, 2014), we also hypothesized that caregivers in Spanish-English bilingual homes who are more heritage culture-oriented would report using more Spanish with their children. Similarly, caregivers who are more US-oriented were expected to report that they use more English with their children.
METHOD

The data used in the present study were collected as part of a larger, on-going research study on bilingual language development. In the larger study, participants include bilingual (English- and Spanish-speaking) caregivers and their children (target $N=54$). Video recordings of caregiver-child interactions (i.e., to measure language use) are collected every six months, starting when the children are 18 months of age and ending when the children are 36 months of age. Additionally, caregivers fill out demographic and language background questionnaires, in addition to an acculturation measure, when their children are 18 months of age. The data analyzed in the present study are from a subsample of participants ($N=37$) where the primary caregiver self-identified as Latina/o and had available video and questionnaire data at both the 18- and 24-month time points (data collection at the latter time point was impacted by COVID-19). These time points (18 and 24 months of age) are of interest because it is when young children are rapidly acquiring and beginning to produce new vocabulary words (Fenson et al., 2014). Additionally, at these ages, young children are typically receiving most of their language input at home, from their primary caregiver (Song et al., 2018). Thus, these early ages are suitable for analyzing children’s language use on the word level in relation to primary caregivers’ language input.

Participants

37 caregiver-child dyads were included in the present study. Children (female = 20; male = 17) were 18 ($M_{age}=18.73$ months; $SD_{age}=1.11$; range=17.97 – 22.87 months) and 24
(M_{age}=25.13 \text{ months}; \textit{SD}_{age}=1.29; \textit{range}=23.67 – 28.23 \text{ months}) \text{ months of age. According to parental report, all children were Latino and had been exposed to Spanish from birth. Most of the target children had also been exposed to English from birth or by their first year of life (N=34). The other three target children received English by their second year of life. Therefore, the target children participating in this study can be considered simultaneous bilinguals who are acquiring both Spanish and English concurrently (De Houwer, 1990; Amengual, 2019).

Of the primary caregivers in this study (N=37; M_{age}=33.29 \text{ years}; \textit{SD}_{age}=4.95 \text{ years}; when their children were 18 \text{ months of age}), the majority were children’s mothers (N=36). One primary caregiver was the child’s father. Most caregivers are college graduates (i.e., received Associate’s or Bachelor’s degrees) or higher (75.67\%; N=28), though 81.1\% (N=30) have completed at least some college. All primary caregivers reported living in the greater Chicago area and identified as Latino, the majority from Mexican descent (75.67\%; N=28); these statistics match the demographics of Latinos in the Chicagoland area (i.e., 73.3\% of Hispanic or Latino individuals are Mexican; American Community Survey, 2019). Other ethnicities (24.3\%) reported by caregivers included Mexican-Guatemalan (N=2), Guatemalan or Guatemalan-American (N=3), Columbian (N=1), Ecuadorian/South American (N=1), Mexican-Argentinian (N=1), and Cuban-Peruvian (N=1). Additionally, all primary caregivers identified as first (37.8\%; N=14) or second (62.2\%; N=23) generation in the United States. Families fell into one of three income categories based on if their household earnings were (1) less than $35,000 annually (N=10), (2) between $35,000 and $75,000 annually (N=14), and (3) greater than $75,000 annually (N=13).
Materials

**Background and Language Questionnaire**

A researcher-developed questionnaire was used to gather information on caregivers’ ethnic and language background, including birthplace, ethnic identity, and generation (see Table 1). The questionnaire included additional questions about when the target children began receiving consistent and significant exposure to English and Spanish. This researcher-developed questionnaire, which was inspired by the Parent Interview Response Questionnaire (Duursma et al., 2007), was also used to determine caregivers’ self-reported language use. Caregivers indicated which language or languages they typically use at home with the target children on a five-point scale survey question, where 5 = *Only Spanish*, 4 = *Mainly in Spanish*, 3 = *In English and Spanish Equally*, 2 = *Mainly in English*, and 1 = *Only English*.

**Socioeconomic Status as a Control Variable**

A researcher-developed questionnaire was used to determine caregiver socioeconomic status (SES), defined as caregivers’ education level and household income (Bradley & Corwyn, 2002), as a control variable (see Table 1). The questionnaire included questions intended to determine caregivers’ education level. Namely, caregivers reported their last grades completed in school on a six-point scale, where 1 = “Elementary–6th Grade”, 2 = “7th–8th Grade”, 3 = “9th–12th Grade”, 4 = “1–2 Years of College”, 5 = “3–4 Years of College”, and 6 = “College Graduate and Higher.” Caregivers also reported their highest degree obtained on a five-point scale, where 1 = “High School Diploma or GED”, 2 = “Associate’s Degree (2-year degree)”, 3 = “Bachelor’s Degree (4-year degree)”, 4 = “Master’s Degree”, 5 = “Doctoral Degree (PhD, JD, MD, etc.)”. Additionally, they reported the annual income of their household as (1) Less than $15,000, (2) $15,000 to $34,999, (3) $35,000 to $49,999, (4) $50,000 to $74,999, (5)
$75,000 to $99,999, and 6) $100,000 or more. Caregivers’ ratings regarding their last grades completed in school are used as the main covariate representing caregivers’ SES in this study (Hollingshead, 2011).

Table 1. Data Collected from Researcher-Developed Questionnaires

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<td>Self-Reported Caregiver Language Use*</td>
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*= Variables used in multiple regression modeling.

**Acculturation Rating Scale for Mexican Americans-II (ARMSA-II)**

The *Acculturation Rating Scale for Mexican Americans-II* (ARMSA-II; Cuéllar et al., 1995), a widely used measure of acculturation, was used to determine caregivers’ acculturation levels. The ARMSA-II was created to assess acculturation in Mexican-American individuals residing in the United States. Consequently, any question on the ARMSA-II that referred to something of Mexican origin also included the clause “or country of origin” to be inclusive of all participants’ cultural backgrounds. Similar adaptations of the ARMSA-II have also been used with participants from other cultures, such as Jamaican-Americans (Ferguson et al., 2012), Arab-Americans (Jadalla & Lee, 2015), and Asian-Americans (Lee et al., 2006).

Scale 1 of the ARMSA-II (Cuéllar et al., 1995) is a bidimensional measure of acculturation comprised of two distinct scales, where one assesses an individual’s Mexican cultural orientation and one assesses their Anglo (i.e., US) orientation. Thus, this scale is comprised of 30 questions, 17 of which are Mexican-/heritage culture-oriented (i.e., comprise the
Mexican Orientation Subscale; MOS; \( \alpha = 0.88 \) and 13 of which are US-oriented (i.e., comprise the Anglo Orientation Subscale; AOS; \( \alpha = 0.86 \)). Test-retest reliability ratings for the MOS and AOS are 0.96 and 0.94, respectively (Cuéllar et al., 1995), and as such, these subscales have excellent internal validity. For the current sample (\( N = 37 \)), Cronbach’s alpha was 0.78 for the ARSMA-II as a whole (\( \alpha = 0.78 \) for the MOS and \( \alpha = 0.87 \) for the AOS).

As the ARSMA-II includes questions about cultural practices and identity, in addition to questions about language use, it is a thorough and multifaceted acculturation measure (Cabassa, 2003; Martinez et al., 2018). For example, some MOS-oriented items are “My family cooks Mexican [or other country of origin] foods” and “My thinking is done in the Spanish language.” The AOS includes similar questions, such as “I like to identify myself as an Anglo American (non-Latino White)” and “I enjoy English language TV.” For each question on the ARSMA-II, caregivers selected the number that best applied to them on to a five-point scale, where 5 = “Extremely often or almost always”, 4 = “Much or very often”, 3 = “Moderately”, 2 = “Very little or not very often”, and 1 = “Not at all”.

Acculturation scores for each caregiver were calculated according to the scoring process described by Cuéllar and colleagues (1995). Thus, each caregiver’s mean MOS score was subtracted from their mean AOS score to obtain each caregiver’s acculturation score. The concurrent validity of the ARMSA-II (\( r = 0.89 \); Cuéllar et al., 1995) conveys that the linear acculturation scores obtained from the ARSMA-II are comparable to the linear acculturation scores that would be obtained from the original ARSMA (Cuéllar et al., 1980). Based on the cutting scores for acculturation levels described by Cuéllar et al. (1995), and in accordance with the distribution of scores for this sample, acculturation scores that are below -1.7 will characterize “strongly heritage culture-oriented” caregivers, scores that fall between -1.7 and -0.1
will characterize “heritage culture-oriented bicultural,” caregivers, and scores that are above -0.1 will characterize “US-oriented bicultural” caregivers in this study,

Four other ARSMA-II subscales were used in this study. By isolating and separating the questions about language use from the questions about social interaction and cultural identity on both the AOS and the MOS, the following four subscales were created: AOS-Language, AOS-Social, MOS-Language, and MOS-Social. Lee and colleagues (2006) used similar subscales of the ARSMA-II with their sample of Asian-Americans, as they isolated and separated the language use and social interaction elements of their Asian Orientation (AOS) and Western Orientation (WOS) Subscales. Internal reliabilities for these subscales in a sample on the west coast of the United States were as follows: WOS-Language $\alpha=0.71$; WOS-Social $\alpha=0.79$; AOS-Language $\alpha=0.90$; and AOS-Social $\alpha=0.72$ (Lee et al., 2006). Based on the factor loadings and divisions specified by Lee et al. (2006), the current study’s AOS-Language included 7 items from the ARSMA-II, while the AOS-Social included 6 items. The MOS-Language and the MOS-Social each included 8 items. The values for the four subscales were obtained by averaging the corresponding item ratings for each participant. Of note, one question from the ARMSA-II was not included in the creation of these subscales (Item #28; “I like to identify myself as Mexican American [or other country of origin]”), as it alone drastically lowered the Cronbach’s alpha for the MOS-Social subscale (to $\alpha=0.46$) and was also excluded by Lee et al. (2006). Thus, the final Cronbach’s alphas for the subscales with the current sample ($N=37$) were: AOS-Language $\alpha=0.91$; AOS-Social $\alpha=0.67$; MOS-Language $\alpha=0.79$; and MOS-Social $\alpha=0.67$. These reliability values are overall consistent with the values reported by Lee et al. (2006) for their similar subscales.
Video Recordings Capturing Spontaneous Language Use During a Structured Play Task

Handheld video cameras (i.e., Sony HDRCX405 HD Video Recording Handycam Camcorders) placed on tripods were used to record caregiver-child interactions during a structured play task (the Three Bags Task; Brady-Smith et al., 1999). This play task utilized age-appropriate toys that were provided by researchers in three cloth bags labeled with the numbers 1, 2, and 3. Video recordings of caregiver-child dyads participating in this task were used to assess spontaneous language use of both primary caregivers (at 18-months) and target children (at 24-months).

General Procedure

The data for this study were collected in two separate visits to the participants’ homes. The first visit occurred when the target children were about 18 months of age. At this visit, research assistants collected questionnaires, administered the ARSMA-II, and video recorded caregiver-child interactions during the 10-minute play task. The second visit occurred six months later, when children were about 24 months of age. At this second time point, research assistants obtained updated questionnaire responses and video recorded caregiver-child interactions during another 10-minute play task. The primary caregiver’s speech from video recordings at child-age 18-months represents caregivers’ spontaneous language use, and the target child’s speech from the video recordings at child-age 24-months represents children’s spontaneous language use. More details are provided in the sections below.

Throughout the study, all questionnaires, including the ARSMA-II, were administered to the caregivers in their preferred language (i.e., in Spanish or English). Additionally, research assistants for this study spoke only to caregivers and children in the caregivers’ preferred language (i.e., in Spanish or English) during visits and observation sessions. The language of
each participant’s visits corresponded with the language of their questionnaires. Families were compensated with gift cards for their participation.

**Administration of Questionnaires and the ARSMA-II**

As noted, during initial visits to participants’ homes, Spanish-English bilingual research assistants administered all questionnaires (i.e., those gathering information about participants’ background, language use, and socioeconomic status) to the caregivers ($N=37$) when or just before their target children reached 18 months of age. Research assistants also administered the ARSMA-II to the caregivers at this time. Six months later, when the target children were approximately 24 months of age, research assistants administered questions about the children’s home language exposure from the background & language questionnaire to the caregivers once more. Specifically, the caregivers’ indicated, once again, which language or languages they typically use at home with the target children on the same five-point scale.

**Collection of Language Samples via Video Recording**

When the target children were about 18 months of age ($N=37$; $M_{age}=18.73$ months; $SD_{age}=1.11$), primary caregivers and target children participated in a structured play task, the Three Bags Task (Brady-Smith et al., 1999). During the Three Bags Task, caregivers were instructed to play with their child using the provided toys in three labeled bags for 10 minutes. The caregivers and children could play with each bag for as long as they desired within the 10 minutes, provided they progressed in order from bag 1 (containing wordless children’s books titled *Good Night Gorilla* and *Buenas Noches Gorila*), to bag 2 (containing a farmhouse set and multiple pairs of toy animals), to bag 3 (containing a toy kitchen set). There were no language use restrictions placed on this task; caregivers could use both Spanish and English during the task as they desired. Research assistants also left the room during the play task as not to interfere
with the task and the participants’ spontaneity of language use. In this task, all speech from the
caregiver was considered to be child-directed, as the interactions were typically characterized by
joint attention between the caregiver and child (Tamis-LeMonda et al., 2017). Therefore, the
spontaneous speech corresponds with caregivers’ self-reported language use from the
background and language questionnaire (i.e., which language or languages they typically use at
home with the target children).

Approximately six months later, when children were about 24 months of age ($N=37$;
$M_{\text{age}}=25.13$ months; $SD_{\text{age}}=1.29$), primary caregivers and target children participated in a second
structured play task session. All instructions and protocols were the same as at the first visit.
However, some play task video recording sessions were conducted outdoors ($N=5$ at 18-months;
$N=22$ at 24-months) or virtually ($N=1$ at 18-months; $N=3$ at 24-months; via Zoom) as a
precaution against COVID-19. Additionally, some video recording sessions were delayed due to
COVID-19 stay-at-home orders. These delayed 18- and 24-month recordings were taken when
children were older than 20 ($N=4$; $M_{\text{age}}=21.54$ months; $SD_{\text{age}}=1.02$) and 26 months of age ($N=9$;
$M_{\text{age}}=27.12$ months; $SD_{\text{age}}=0.78$), respectively.

**Scoring**

**Transcription of Caregiver and Child Speech.** All Spanish and English speech from
the caregivers and target children in the video recordings (10 minutes each) was transcribed.
Transcription (i.e., a systematic, written record of speech) was guided by the standard
conventions of the Codes for the Human Analysis of Transcripts (CHAT) system of the Child
Language Data Exchange System (CHILDES; MacWhinney, 2010). All transcribers, who are
proficient in English and Spanish, have been trained to reliability (>85% inter-rater reliability)
using the CHAT transcription conventions.
The CHAT transcription conventions used for this study specify that all speech must be transcribed in its entirety. Thus, transcribers were required to transcribe all fillers (i.e., sounds like “um” or “uh”), unintelligible speech, word repetition, and babbling (i.e., infants’ experimentation with consonant and vowel paired sounds that are not yet words). The conventions also specify that speech must be broken into utterances, segments of speech that are bounded by pauses or other interruptions in one’s speech patterns. Additionally, as these transcripts included speech in English and Spanish, transcribers indicated the language of the speech they transcribed, both at an utterance level, and, when necessary, at the word level. All transcripts were checked by a second reliable transcriber to ensure that CHAT conventions and language rules were correctly used prior to speech quantification. Then, a third reliable bilingual transcriber checked all child speech in the transcripts to mark instances of children’s unintentional vocalizations (e.g., reduplications, canonical babbling) to distinguish them from instances of intentional vocalizations (e.g., recognized words, protowords). Protowords or mispronounced words were transcribed phonetically, but they were followed with [: intended word] so they would be counted by the system during speech quantification.

**Quantification of Caregiver and Child Speech.** The number of word tokens (i.e., the total number of words spoken by an individual in a segment of speech) in English and Spanish spoken during these language samples was used to quantify caregivers’ and children’s spontaneous language use. In the language development literature, word tokens and word types (i.e., the number of unique or different words spoken by an individual in a segment of speech) are respectively used to measure the frequency and diversity (i.e., the quantity and quality) of speech (Huttenlocher et al., 2010; Rowe, 2012). Accordingly, in this study, the number of word tokens in each language used by caregivers at 18-months and the number of word tokens in each
language used by the target children at 24-months represents caregivers’ and children’s spontaneous language use, respectively. A higher number of word tokens in a language represents more language use in that language. Similarly, a lower number of word tokens in a language represents less language use in that language. However, the bilingual language use for caregivers at 18-months and children at 24-months was conceptualized as ratios calculated by dividing the number of Spanish tokens by the number of English tokens used in a transcript. For these ratios, scores from zero to 1 indicated more English than Spanish use; scores equal or near to 1 indicated a balanced use of English and Spanish (i.e., more balanced bilingualism), and scores greater than 1 indicated more Spanish than English use.

Thus, for each transcript, the number of word tokens in English and Spanish was determined for the caregivers (at 18-months) and for the target children (at 24-months) using the Computerized Language Analysis (CLAN; MacWhinney, 2010) software of CHILDES. In particular, the FREQ command with the -l switch (MacWhinney, 2010) was used to count the number of word tokens in both English and Spanish in each transcript. The FREQ command also included a specification to only count the words spoken by the primary caregiver (i.e., t*MOT or t*FAT) for the 18-month transcripts. Similarly, the FREQ command included a specification to only count the words spoken by the target child (i.e., t*CHI) for the 24-month transcripts.

Identification of Caregiver and Child Words. Any words that were said clearly and in full by caregivers and children were counted as word tokens. However, because children’s vocalizations can convey meaning, regardless of correct pronunciation (e.g., protowords) or exact reproduction of an adult word target (i.e., a word said by an adult that a child is trying to replicate), children’s vocalizations were also counted as word tokens if (1) they were used in an appropriate context with a clear referent or (2) the child reproduced a consonant-vowel (CV) or
vowel-consonant (VC) pairing consistent with the adult word target (Huttenlocher et al., 1991). For example, if a child said “ita,” in response to their mother saying “sopita [a little soup],” that child’s vocalization would be counted as a word token, as it reproduced part of the adult word target. Additionally, onomatopoeic sounds were counted as tokens if they were also used in an appropriate context with a clear referent. For example, “neigh” was counted as a token in instances where the child or caregiver made that onomatopoeic vocalization while holding or pointing at a toy horse. In this instance, the onomatopoeic sound “neigh” was also counted for the caregiver because their communicative intention was to initiate an imitative response from the child. Therefore, onomatopoeic sounds were also counted as tokens if the child said them in imitation of their caregiver (Pan et al., 2005) or in response to a response-initiating question from the caregiver (e.g., “What does the horse say?”).

Analytic Plan

SPSS 27 (IBM Corp., 2020) and the PROCESS tool for SPSS (Hayes, 2017) were used for all analyses related to the first and second hypotheses. In regard to the first hypothesis of the study, that the relation between caregivers’ acculturation level and their children’s bilingual use would vary as a function of caregivers’ bilingual language use from six months prior, we first examined the number of word tokens used by caregivers and children by caregiver acculturation level. We then ran a mediational model to investigate whether caregivers’ level of acculturation predicted children’s bilingual language use, as a function of caregivers’ bilingual language use, in our sample. The hypothesized structure for this main mediational model is based on the Integrative Model of Child Development (García Coll et al., 1996). In particular, Garcia Coll and colleagues (1996) posit that acculturation, nested under the concept of adaptive cultures, influences children’s developmental outcomes directly and indirectly through family processes.
Similar pathways have also been suggested in the literature (Cote & Bornstein, 2014; Troesch et al., 2021). Further, we ran regression analyses to confirm the coefficient values for each path of the main mediational model (i.e., the causal steps approach; Baron & Kenny, 1986), as well as additional mediation analyses to explore whether the multidimensional conceptualization of acculturation (rather than solely the language domain of acculturation) was driving the effects on caregivers’ and children’s bilingual language use.

In relation to the second hypothesis of the study, that caregivers in Spanish-English bilingual homes who are more heritage culture-oriented would report using more Spanish with their children, and vice versa for more US-oriented caregivers, we summarized caregivers’ self-reported bilingual language use ratings by caregiver acculturation level. Moreover, we ran a multiple regression model to determine whether caregiver acculturation was a significant predictor of caregivers’ self-reported bilingual language use, when controlling for caregivers’ education level. This model was chosen as findings in the literature support that bilingual caregivers’ acculturation level is related to their self-reported language use (Cote & Bornstein, 2014) and proficiency (Troesch et al., 2021). Caregivers’ education level (i.e., a measure of socioeconomic status) was included as a covariate, as it has been thought to influence caregivers’ language use tendencies (Hammer et al., 2012; Hollingshead, 2011).
RESULTS

Preliminary Analyses

Before performing any of the statistical analyses in this study, preliminary analyses were conducted to ensure that all assumptions were satisfied. First, two participants were identified as outliers, as the number of Spanish and/or English tokens they used at were greater than or less than +/-3 standard deviations from the mean (Kwak & Kim, 2017). Their data were excluded from all subsequent analyses. Second, the normality and homoscedasticity assumptions were checked for the variables used in regression and mediation analyses. Skewness statistics indicated that both main bilingual language use variables (i.e., the Spanish to English tokens ratios for caregivers and children) were right skewed (caregiver bilingual language use at 18-months = 4.340; child bilingual language use at 24-months = 2.472). Therefore, those two variables were log-transformed (using the natural logarithm) for regression and mediation analyses. It is worth mentioning that slight heteroscedasticity resulted when log-transforming the bilingual language use variables in the cases where they were regressed onto caregiver acculturation level. Because this heteroscedastic variance trend was not extreme, the log-transformations were maintained. Further, when comparing across caregiver acculturation levels, there was homogeneity of variance for all other variables, except for the raw numbers of English tokens used by caregivers and children. Finally, the assumption of multicollinearity was checked. Multicollinearity was not evident among the main variables (all VIFs = 1.0). Thus, the data is suitable for regression and mediation analyses.
Caregivers’ self-reported language use ratings from the 18-month time point were also compared to their self-reported language use ratings from the 24-month time point. At both time points, caregivers, on average, rated their bilingual language use as falling between 3 and 4 on the 5-point scale (between “Spanish and English Equally” to “Mostly Spanish;” \(M_{18-months}=3.97; \ SD_{18-months}=0.785; \ M_{24-months}=3.76; \ SD_{24-months}=0.987\)). Ratings from the two time points had a moderately strong correlation \((r=0.695)\). Therefore, as caregivers’ self-reported language use data is reliable across the two time points, we will use only the 18-month ratings in analyses.

Additionally, as some play task video recording sessions were conducted outdoors or virtually as a precaution against COVID-19, Kruskal-Wallis tests were conducted prior to main analyses. Kruskal-Wallis tests were used because skewness was found in the raw numbers of tokens, and caregiver acculturation group sizes were unbalanced. These tests revealed that there were no statistically significant differences (all \(p\’s > 0.05\)) in the number of Spanish or English tokens used by caregivers at 18-months. There were also no statistically significant differences (all \(p\’s > 0.05\)) found in the number of Spanish or English tokens used by children at 24-months. Thus, all analyses could be performed using the three types of video recordings (i.e., indoor, outdoor, and virtual) together.

Moreover, as some video recording sessions were delayed due to COVID-19 stay-at-home orders, Mann-Whitney U tests were performed. Mann-Whitney U tests were used instead of \(t\)-tests again due to skewness and unbalanced groups. These analyses revealed that participants with delayed visits did not use significantly different numbers of tokens (all \(p\’s > 0.05\)) than caregivers at 18-months or children at 24-months. Thus, all analyses could include delayed data, as these data were not significantly different than data collected closer to the target age.
Descriptive Analyses

To test the first hypothesis of the study, that caregivers who are more heritage culture-oriented and their children would use more Spanish word tokens than more US-oriented caregivers and children, the average number of word tokens used by caregivers and children (at 18- and 24-months, respectively) was compared across caregiver acculturation levels (see Table 2). It was found that strongly heritage culture-oriented caregivers \( (M_{\text{Spanish}}=618.50; \ SD=144.98; \ M_{\text{English}}=14.33; \ SD=9.61) \) and their children \( (M_{\text{Spanish}}=49.83; \ SD=26.30; \ M_{\text{English}}=7.00; \ SD=8.17) \) used the most Spanish, at ratios of 43:1 and 7:1. Heritage culture-oriented bicultural caregivers \( (M_{\text{Spanish}}=491.50; \ SD=185.02; \ M_{\text{English}}=49.64; \ SD=48.67) \) and their children \( (M_{\text{Spanish}}=38.86; \ SD=32.19; \ M_{\text{English}}=9.73; \ SD=11.67) \) also used more Spanish than English (at 10:1 and 4:1 ratios), though to a lesser degree than the strongly heritage culture-oriented caregivers.

Additionally, US-oriented bicultural caregivers also used more Spanish than English, but only at about a 3:1 Spanish to English ratio \( (M_{\text{Spanish}}=356.86; \ SD=115.01; \ M_{\text{English}}=118.86; \ SD=183.03) \). However, children of US-oriented caregivers, on average, tended to use more English than Spanish, at about a 1:2 Spanish to English ratio \( (M_{\text{Spanish}}=15.43; \ SD=13.04; \ M_{\text{English}}=28.86; \ SD=35.73) \). Kruskal-Wallis tests (4; for Spanish and English tokens at 18- and 24-months) revealed that there were statistically significant differences in the number of Spanish tokens used by caregivers at 18-months \( (H(2) = 8.451; \ p = 0.015) \) and by children at 24-months \( (H(2) = 6.126; \ p = 0.047) \) between at least two of the three acculturation groups. The non-parametric Kruskal-Wallis tests were again used in place of one-way ANOVAs because skewness, heterogenous variance (as indicated by significant Levene’s tests), and unbalanced sample sizes were evident when data were grouped and analyzed by caregiver acculturation level.
Table 2. Average Amount of Bilingual Language Use by Caregiver Acculturation Group

<table>
<thead>
<tr>
<th>Caregiver acculturation</th>
<th>Measure</th>
<th>Caregiver language use at 18-months</th>
<th>Child language use at 24-months</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strongly heritage culture-oriented</td>
<td>Average number of Spanish tokens</td>
<td>618.50 (144.98)&lt;sup&gt;a&lt;/sup&gt;</td>
<td>49.83 (26.30)&lt;sup&gt;b&lt;/sup&gt;</td>
</tr>
<tr>
<td>(N = 6)</td>
<td>Average number of English tokens</td>
<td>14.33 (9.61)</td>
<td>7.00 (8.17)</td>
</tr>
<tr>
<td></td>
<td><strong>Spanish:English tokens ratio</strong></td>
<td><strong>43:1</strong></td>
<td><strong>7:1</strong></td>
</tr>
<tr>
<td>Heritage culture-oriented bicultural</td>
<td>Average number of Spanish tokens</td>
<td>491.50 (185.02)&lt;sup&gt;a&lt;/sup&gt;</td>
<td>38.86 (32.19)&lt;sup&gt;b&lt;/sup&gt;</td>
</tr>
<tr>
<td>(N = 22)</td>
<td>Average number of English tokens</td>
<td>49.64 (48.67)</td>
<td>9.73 (11.67)</td>
</tr>
<tr>
<td></td>
<td><strong>Spanish:English tokens ratio</strong></td>
<td><strong>10:1</strong></td>
<td><strong>4:1</strong></td>
</tr>
<tr>
<td>US-oriented bicultural</td>
<td>Average number of Spanish tokens</td>
<td>356.86 (115.01)&lt;sup&gt;a&lt;/sup&gt;</td>
<td>15.43 (13.04)&lt;sup&gt;b&lt;/sup&gt;</td>
</tr>
<tr>
<td>(N = 7)</td>
<td>Average number of English tokens</td>
<td>118.86 (183.03)</td>
<td>28.86 (35.73)</td>
</tr>
<tr>
<td></td>
<td><strong>Spanish:English tokens ratio</strong></td>
<td><strong>3:1</strong></td>
<td><strong>1:2</strong></td>
</tr>
</tbody>
</table>

Note: Caregivers’ and children’s English tokens had nonsignificant Kruskal-Wallis H values.  
<sup>a</sup> The Kruskal-Wallis H was significant for caregivers’ Spanish tokens at 18-months (p < 0.05).  
<sup>b</sup> The Kruskal-Wallis H was significant for children’s Spanish tokens at 24-months (p < 0.05).

To test the second hypothesis of the study, the variation in parent-reported language use was examined. On the parent-report measure of bilingual language use, strongly heritage culture-oriented caregivers (N=6) reported using “only Spanish” or “mostly Spanish” with their children (M=4.83; SD=0.41). In contrast, both groups of bicultural caregivers reported using more balanced amounts of Spanish and English with their children, on average. That is, caregivers’ average reported scores fell between 3 (“Spanish and English Equally”) and 4 (“Mostly Spanish”) on the 5-point scale. In particular, heritage culture-oriented bicultural caregivers (N=22) reported using slightly more Spanish (M=3.82; SD=0.80) than US-oriented bicultural caregivers (N=7; M=3.71; SD=0.49). Another Kruskal-Wallis test was used to analyze variation in parent-reported language use. It revealed that there was a statistically significant difference in caregivers’ self-reported language use between at least two of the three acculturation groups (H
(2) = 9.624; \( p = 0.008 \). Of note, no caregivers in this study reported using only English (i.e., a score of 1) with their child.

**Inferential Analyses**

**Multiple Regression with Self-Reported Caregiver Language Use**

To further examine the second hypothesis of the study, a multiple regression analysis was performed to determine the best predictor of caregivers’ self-reported language use. Caregivers’ (\( N = 35 \)) acculturation level, which was entered as a continuous variable, and education level (i.e., last grades completed in school) were entered in a multiple regression model. Only caregivers’ acculturation level was found to significantly predict their self-reported language use (\( B = -0.457; \ p = 0.003 \); see Table 3). In particular, when caregivers were more oriented to their heritage culture, the more they rated their language use as “Only Spanish” or “Mainly Spanish” (i.e., 4 or 5 on the self-report measure of caregiver language use given when their children were 18-months).

Table 3. Predictors of Self-Reported Caregiver Language Use

<table>
<thead>
<tr>
<th>Parameter Estimates</th>
<th>( B )</th>
<th>( SE )</th>
<th>( t )-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>3.495***</td>
<td>0.541</td>
<td>6.458</td>
</tr>
<tr>
<td>Caregiver Acculturation</td>
<td>-0.457**</td>
<td>0.141</td>
<td>-3.240</td>
</tr>
<tr>
<td>Caregiver Education Level</td>
<td>0.025</td>
<td>0.095</td>
<td>0.265</td>
</tr>
</tbody>
</table>

*Note:* Caregiver education level (i.e., caregivers’ last grades in school, as measured on a six-point scale) is a measure of socioeconomic status (Hollingshead, 2011).

***\( p < 0.001 \), **\( p < 0.01 \)

**Main Mediation Analyses**

Returning to the first hypothesis of the study, we ran a mediation analysis to examine whether caregivers’ bilingual language use acted as a mediator between caregivers’ acculturation level (the predictor variable) and children’s bilingual language use six months later (the outcome variable). As previously mentioned, the bilingual language use variables are ratios of the number
of Spanish tokens to the number of English tokens. As such, ratio scores between 0 and 1 indicate that more English than Spanish was used, while scores above 1 indicate that more Spanish than English was used. These ratio scores were log-transformed to correct for non-normality. Additionally, higher linear acculturation scores indicate greater US-orientation and lower linear acculturation scores indicate greater heritage culture-orientation. These three variables were entered as continuous variables. Due to statistical limitations associated with these transformations, the final sample size used for mediational analyses was $N=30$. The five participants removed were from the heritage culture-oriented bicultural and US-oriented bicultural groups.

The output from PROCESS provided the confidence interval (CI) for the overall indirect effect, in addition to the unstandardized beta coefficients ($B$) for individual paths within the mediational model. Specifically, the coefficients for the following conceptual mediational paths were provided: path $a$ = effect of $X$ on $M$, path $b$ = effect of $M$ on $Y$, and path $c' = \text{indirect}$ effect of $X$ on $Y$, where $X$ = the predictor variable (e.g., caregivers’ acculturation level), $M$ = the mediator variable (e.g., caregivers’ bilingual language use), and $Y$ = the outcome variable (children’s bilingual language use). The coefficients for path $a$, $b$, and $c'$, along with the coefficient for path $c$, the direct effect of $X$ on $Y$, were confirmed using a series of individual regression models (i.e., the causal steps approach; Baron & Kenny, 1986; see Table 4) outlined in the three equations below (MacKinnon et al., 2007), where $i$ represents an intercept.

1. $Y = i_1 + cX$
2. $M = i_2 + aX$
3. $Y = i_3 + bM + c'X$
Mediation is evident when $a$, $b$, and $c$ are all significant ($p < 0.05$), and $c' < c$ (Baron & Kenny, 1986). Additionally, mediation is present when $c'$, the direct effect of $X$ on $Y$ adjusted for $M$, is non-significant (Fritz & MacKinnon, 2007). Full or complete mediation is said to occur when the effect of $X$ on $Y$ is completely accounted for by the mediator (i.e., $c' = 0$ in the third equation; Wu & Zumbo, 2007). The relationship between $X$ and $Y$ is said to be partially mediated if $c'$ is a non-zero coefficient that is smaller in magnitude than $c$ (Wu & Zumbo, 2007). Visual, conceptual representations of the three equations from the causal steps approach to mediation can be found below (see Figures 1 and 2).

Figure 1. Visual Representation of the Direct Effect of $X$ on $Y$

![Figure 1](image1.png)

Figure 2. Visual Representation of Mediation and the Indirect Effect of $X$ on $Y$

![Figure 2](image2.png)

The mediational analysis in PROCESS revealed that the hypothesized model had a significant indirect effect. That is, caregivers’ acculturation level ($X$) affected children’s bilingual language use (i.e., $Y$; the natural log of the ratio of Spanish to English tokens used at 24-months) when caregivers’ bilingual language use (i.e., $M$; the natural log of the ratio of Spanish to English tokens used at 18-months) was acting as a mediator. That is, zero was not within the bounds of the 95% CI [-0.8457, -0.0061] (Hayes & Rockwood, 2017). It is also worth
mentioning that an additional mediational analysis was performed to investigate the relation between caregivers’ and children’s bilingual language use, with caregiver acculturation as a mediator. Mediation was not supported (i.e., the indirect effect was not significant) in that second model, as zero was within the bounds of the 95% CI [-0.0801, 0.2125] (Hayes & Rockwood, 2017).

Table 4. Regressions Relating Acculturation to Caregiver and Child Bilingual Language Use

<table>
<thead>
<tr>
<th>Parameter Estimates</th>
<th>B</th>
<th>SE</th>
<th>t-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>0.836</td>
<td>0.328</td>
<td>2.549</td>
</tr>
<tr>
<td>Caregiver Acculturation (path $c$)</td>
<td>-0.661*</td>
<td>0.255</td>
<td>-2.594</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Parameter Estimates</th>
<th>B</th>
<th>SE</th>
<th>t-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>2.314</td>
<td>0.358</td>
<td>6.464</td>
</tr>
<tr>
<td>Caregiver Acculturation (path $a$)</td>
<td>-0.630*</td>
<td>0.278</td>
<td>-2.265</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Parameter Estimates</th>
<th>B</th>
<th>SE</th>
<th>t-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>-0.124</td>
<td>0.470</td>
<td>0.793</td>
</tr>
<tr>
<td>Caregiver Bilingual Language Use (path $b$)</td>
<td>0.415*</td>
<td>0.157</td>
<td>2.640</td>
</tr>
<tr>
<td>Caregiver Acculturation (path $c'$)</td>
<td>-0.400</td>
<td>0.252</td>
<td>-1.587</td>
</tr>
</tbody>
</table>

*p<0.05

The regression analyses ($N=30$) performed to confirm the unstandardized $B$ coefficients (see Table 4) revealed a strong and positive relation ($B = -0.661; p < 0.05$) between caregivers’ acculturation and children’s bilingual language use (path $c$; direct effect). That is, as caregivers’ acculturation scores decrease by one unit (i.e., are more heritage culture-oriented), there is an associated 48.37% ($e^{-0.661} - 1)*100$ (UCLA: Statistical Consulting Group, 2021) increase in children’s bilingual language use ratio (i.e., more Spanish) at 24-months. Strong and negative relations were also found between caregivers’ acculturation and caregivers’ bilingual language use (path $a$; $B = -0.630; p < 0.05$), and between caregivers’ acculturation and children’s bilingual language use (path $b$; $B = 0.415; p < 0.05$). The results for path $a$ reveal that as caregivers’ acculturation scores decrease by one unit (i.e., are more heritage culture-oriented), there is an
associated 46.74% \(((e^{-0.630} - 1)\times100)\) increase in caregivers’ bilingual language use ratio (i.e., more Spanish) at 18-months. The results for path b show that as caregivers’ bilingual language use increases by 1% (i.e., more Spanish), their children’s bilingual language use ratio increases by 0.415% (i.e., more Spanish) six months later (Stock & Watson, 2006; UCLA: Statistical Consulting Group, 2021). The indirect path \((c')\) was nonsignificant \((B = -0.400; p = 0.124)\).

These findings confirm that all components of the causal steps approach (Baron & Kenny, 1986; Fritz & MacKinnon, 2007) were satisfied, therefore supporting that caregivers’ bilingual language use is acting as a mediator for the relation between caregivers’ acculturation and their children’s bilingual language use six months later (see Figure 3).

Figure 3. Visual Representation of the Final Mediational Model

Note: The bilingual language use variables are log-transformed Spanish to English tokens ratios. Values reported are unstandardized \(B\) values. The value in the parentheses represents \(c'\).

*\(p<0.05\)

In general, the findings from this initial mediation and related regression analyses indicate that, when caregivers are more heritage culture-oriented, their children use more Spanish than English. Caregivers also use more Spanish than English when they are more heritage culture-oriented. These results additionally reveal that as caregivers use more Spanish, their children use more Spanish six months later, and vice versa for English use. Overall, these findings provide support for the first hypothesis of this study, as caregiver acculturation
significantly predicted children’s bilingual language use by way of caregivers’ bilingual language use.

**Mediation Analyses Using ARSMA-II Subscales**

As a more nuanced exploration of the mediational relationship revealed by the initial mediation analysis, four additional mediation analyses were run on PROCESS. As past studies have used language as the sole proxy measure for acculturation (Lee et al., 2011; Marsiglia et al., 2011), these additional analyses were performed to examine whether only the language domain of acculturation (or conversely, only the socio-cultural domain of acculturation) was driving the significant mediational relation found in the initial analysis. Therefore, the AOS-Language, AOS-Social, MOS-Language, and MOS-Social subscales were used in these additional analyses, along with the raw numbers of English and Spanish tokens used by caregivers and children at 18- and 24-months. Specifically, the four additional mediation analyses examined:

1. the relation between caregivers’ acculturation scores on only the English language items on the ARSMA-II (AOS-Language) and the number of English tokens used by children at 24-months, as a function of the number of English tokens used by caregivers at 18-months,

2. the relation between caregivers’ acculturation scores on only the Anglo-oriented (i.e., US-oriented) social interaction and cultural identity items on the ARSMA-II (AOS-Social) and the number of English tokens used by children at 24-months, as a function of the number of English tokens used by caregivers at 18-months,

3. the relation between caregivers’ acculturation scores on only the Spanish language items on the ARSMA-II (MOS-Language) and the number of Spanish tokens used by children at 24-months, as a function of the number of Spanish tokens used by caregivers at 18-months,
(4) the relation between caregivers’ acculturation scores on only the heritage culture-oriented (i.e., Mexican-oriented) social interaction and cultural identity items on the ARSMA-II (MOS-Social) and the number of Spanish tokens used by children at 24-months, as a function of the number of Spanish tokens used by caregivers at 18-months.

As certain variables were skewed, some transformations were performed prior to running the analyses in PROCESS. In particular, the AOS-Language variable was squared, and the numbers of English tokens used by caregivers and children were log-transformed. Again, the sample size for all four analyses was $N=30$.

Results from the four PROCESS runs indicated that there were no significant mediational relations found. That is, all 95% confidence intervals for the indirect effect included zero in their bounds (Hayes & Rockwell, 2017). Thus, neither the language nor socio-cultural domains of acculturation can be said to drive the initial significant relation found between overall caregiver acculturation and children’s bilingual language use, as a function of caregivers’ bilingual language use. Instead, the whole, multidimensional construct of acculturation, not just one of its domains (Schwartz et al., 2010), better predicts caregivers’ and children’s bilingual language use in the home.
DISCUSSION

The language input that young DLLs receive from their primary caregivers influences their cultural knowledge and bilingual language outcomes (Arriagada, 2005; Lewis et al., 2016; Vygotsky, 1978). However, few studies have investigated how cultural contexts, and namely the related concept of acculturation, affect bilingual language use and development in Latino families (Boyce et al., 2013; Cote & Bornstein, 2014), despite the continued high rates of immigration to the US from Latin American countries (American Community Survey, 2018; Budiman et al., 2020). Thus, the current study examined the relation of Latino primary caregivers’ acculturation level to their children’s bilingual language use, as a function of caregivers’ bilingual language use from six months prior. Specifically, we video recorded caregiver-child dyad interactions during a 10-minute play task to obtain samples of caregivers’ and children’s spontaneous language use. We also relied on a robust measure of acculturation, Scale 1 of the ARSMA-II (Cuéllar et al., 1995), as acculturation is a complex concept comprised of multiple, related domains, including language, cultural practices, values, and identity (Schwartz et al., 2010).

The first main finding from this study was that acculturation significantly influenced children’s bilingual language use, as a function of caregivers’ bilingual language use from six months prior. Of note, the relation between caregivers’ acculturation level and language use was significant regardless of which measure of caregiver language was used, spontaneous speech samples or a self-report measure. The second main finding was that the multidimensional
concept of acculturation, rather than only the language or socio-cultural domains of acculturation, predicted caregivers’ and children’s bilingual language use. These strengths and findings are detailed below.

Descriptive analyses on the number of word tokens used by each caregiver acculturation group revealed that strongly heritage culture-oriented caregivers (i.e., the most heritage culture-oriented caregivers) and their children used the most Spanish at 18- and 24-months, in comparison to the two more bicultural acculturation groups. This finding is consistent with findings from monolingual and bilingual studies showing that the quantity of input a child receives in one language predicts the child’s development of that language (De Houwer, 2011; Hart & Risley, 1995; Hoff et al., 2012; Huttenlocher et al., 1991; Pearson et al., 1997). It also lends support to sociocultural theories, as the bilingual language use tendencies of the participating children were affected by linguistic interactions with their primary caregivers (Vygotsky, 1978).

Furthermore, descriptive analyses revealed that, although US-oriented biculural caregivers (i.e., the most US-oriented group) used more Spanish than English at 18-months, their children used more English than Spanish at 24-months. That is, though all caregivers used more Spanish than English at 18-months, the children who received the most English language input from their primary caregivers used the highest number of English tokens six months later. This finding is notable because it may reflect trends described by the three-generation model of linguistic assimilation (Alba et al., 2002). This model suggests that individuals who are third generation (i.e., their grandparents were immigrants) in the US tend to use only or significantly more English than their grandparents’ native language. This trend is likely to occur even though their parents (i.e., second generation individuals) and grandparents (i.e., first generation
individuals) would have been bilinguals who used their native language more consistently. Indeed, the children in the US-oriented bicultural group in our study were all third generation ($N=7$), and they were also the only group that used more English than Spanish.

A multiple regression analysis revealed that caregivers’ acculturation level significantly predicts caregivers’ self-reported bilingual language use. Indeed, related descriptive analyses also revealed that strongly heritage culture-oriented bicultural caregivers (i.e., the most heritage culture-oriented caregivers) reported using “only Spanish” or “mostly Spanish” with their children. Caregivers from the other two caregiver acculturation groups reported using more balanced amounts of Spanish and English with their children. These findings are in line with findings of previous studies that assessed caregivers’ acculturation level and self-reported language use or proficiency (Cote & Bornstein, 2014; Troesch et al., 2021).

Through mediation and regression analyses, we found that acculturation was related to children’s bilingual language use, as a function of caregivers’ bilingual language use from six months prior. In particular, when caregivers were more heritage culture-oriented, they used more Spanish than English with their children during a 10-minute play task, and in turn, their children used more Spanish than English during a separate 10-minute play task six months later. These results support the limited findings in the literature showing that caregivers’ acculturation level significantly affects their children’s language outcomes (Boyce et al., 2013; Troesch et al., 2021) through caregivers’ language use tendencies (Cote & Bornstein, 2014). However, these prior studies have primarily relied on parent-reported language data. Therefore, our study findings uniquely contribute to the literature because we showed that the relation between caregiver acculturation level and children’s bilingual language use, by way of caregivers’ bilingual language use, can also be found when spontaneous speech samples from caregivers and their
children are utilized. Moreover, we utilized a measure (Scale 1 of the ARSMA-II; Cuéllar et al., 1995) that captures multiple domains of acculturation, rather than using one with only language-related items (Boyce et al., 2013), to better capture the complex nature of acculturation.

 Relatedly, through additional mediation analyses utilizing researcher-created ARSMA-II subscales, we found that the relation between caregiver acculturation and children’s bilingual language use, by way of caregivers’ bilingual language use, was driven by acculturation as a multidimensional concept. That is, predicting caregivers’ and children’s language use with the linguistic (AOS-Language and MOS-Language subscales) and socio-cultural (AOS-Social and MOS-Social subscales) items from the ARSMA-II, in place of the caregivers’ overall acculturation score, did not produce significant mediational results. Thus, it seems that the whole, multidimensional concept of acculturation, which includes more contextual factors than proxy or unidimensional measures of acculturation (Cabassa, 2003; Schwartz et al., 2011), must be measured to see the effect on caregivers’ and children’s bilingual language development. These findings suggest that it is possible to miss the true effects of acculturation on children’s development, including their bilingual language development, if only one domain of acculturation, such as language use or proficiency, is used as a proxy measure for the full concept (Schwartz et al., 2011, Thomson & Hoffman-Goetz, 2009).

 Taken together, our findings are consistent with the Integrative Model of Child Development (García Coll et al., 1996). In this model, García Coll and colleagues emphasize that culture directly and indirectly affects children’s development, including their language development, through family processes. Similarly, our findings show that for Latino families, acculturation influences children’s bilingual language development through their primary caregivers’ bilingual language use tendencies. Of note, acculturation significantly influenced
caregivers’ bilingual language use when spontaneous speech samples, not self-report measures of language use, were used. Furthermore, these relations were found when a multidimensional conceptualization of acculturation, not just the language domain, was used as a predictor of language use.

**Limitations and Future Directions**

This study has some limitations, most of which are related to sample characteristics, that can inform directions for future research relating acculturation to children’s bilingual language development. First, as the data collection component of this study was labor-intensive and partially disrupted by the COVID-19 pandemic, some participants did not agree to participate in video recording sessions when their children were 24 months of age. This restricted the final sample sizes that we were able to use for descriptive ($N=35$) and mediation analyses ($N=30$). While our sample size for the mediation analysis was relatively low, it is not uncommon for labor-intensive studies, such as ours, to have lower samples sizes (e.g., Place & Hoff, 2011; $N=29$). Moreover, significant mediational results were still found with a sample size of 30, suggesting that they would be found with larger sample sizes too. Thus, a future direction would be to replicate this study with a larger sample size.

Second, it is likely that children in our study are receiving language input from other sources (e.g., television), interlocutors (e.g., other family members), or contexts (e.g., daycare), in addition to the language input from their primary caregiver. It is also possible that children may be getting more significant input in a language their primary caregiver is not prioritizing. This could potentially affect how children’s bilingual language use tendencies relate to other variables and are reflected in our data. Therefore, another future direction would be to investigate
how secondary or other caregivers’ acculturation levels and bilingual language use may affect children’s bilingual language use.

Additionally, the current study only analyzes data from two time points, when the children were 18 and 24 months of age. Thus, future studies are needed that employ longitudinal designs and analyses. In these studies, researchers could see if the mediational trend that we identified holds true as children age past 24 months of age. For example, future studies should address whether caregivers’ acculturation level and early bilingual language use still predict children’s bilingual language use once they enter school, or if they only predict children’s initial patterns of bilingual use when they are first acquiring language skills. Further, these studies could address whether these longitudinal trends could be affected by children’s generation, as may be suggested by the three-generation model of linguistic assimilation (Alba et al., 2002).

Finally, this study may have limited generalizability to bilingual families who are not from Latino (namely Mexican) backgrounds or who do not speak Spanish. By focusing on within-culture variations, we also faced the challenge of working with skewed and non-normal data that, in many cases, needed to be transformed or analyzed with nonparametric tests. However, by focusing on within-group variations in this study, we were able to highlight unique patterns of acculturation and bilingual language use specifically for Latino families in the US. In particular, our study findings revealed that Latino caregivers’ acculturation level may influence their spontaneous bilingual language use, not just their self-reported bilingual language use, and in turn, their children’s bilingual language use.
REFERENCE LIST


VITA

Jordan Sierra Perry was born and raised in Milwaukee, Wisconsin. Prior to entering graduate school at Loyola University Chicago, Perry attended Miami University (OH) where she earned her Bachelor of Arts in Biology, along with a co-major in Neuroscience and a minor in Spanish. Perry currently works under Dr. Perla B. Gámez in the Bilingual Language Development Laboratory at Loyola. In particular, she studies factors that promote bilingual (Spanish-English) language development in toddlers, such as caregivers’ characteristics and culture.