DUAL LANGUAGE FACTORS AND THEIR ASSOCIATIONS WITH LANGUAGE AND

LITERACY IN SCHOOL-AGE CHILDREN

by

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THESIS ABSTRACT

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The purpose of this study is to use variables from a bilingual experience questionnaire and gather associations about strongest proficiency outcomes using standardized language and literacy measures in a sample of Spanish-English bilingual children. Participants were administered standardized measures in both Spanish and English. Results revealed insignificant associations in children's Age of Acquisition (AoA), reported current language input and output, and parents' perceptions of oral language experiences as a contributor to their language and literacy skills. Some within and cross-language associations were discovered such as children's AoA reading in English being positively correlated with grammar in Spanish, reported current language input in Spanish and English having a positive correlation with grammar skills in English, and parents' perceptions of oral language experiences with family in Spanish correlated to children's vocabulary in Spanish. Results indicate that future research must continue to understand the language experiences that support bilingual language literacy development.

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Introduction

In the United States, by the year 2050, it is estimated that approximately 39% of children under the age of 5 will come from homes where Spanish is spoken (U.S. Census Bureau, 2012; Keffala et al., 2020). Spanish-speaking children make up the largest group of second language learners in the United States (Roseberry-Mckibben & Eicholts, 1994) and are often referred to as Dual Language Learners (DLLs). DLLs are known as children who are learning another language in addition to learning English. Given the rise of DLLs in the United States, research must examine how they process and manage two languages. For DLLs ages birth to three, growing bodies of research discuss early language experiences and their ability to influence their language and literacy outcomes. These bodies of work provide information about DLLs at the early stages of language development. However, there is limited literature on how DLLs manage and process two languages as they reach early adolescence. Specifically, DLLs in the school-age period are less understood than young infants and toddlers. The present study aims to understand how different facets of the bilingual experience including the timing of first exposure to each language (i.e., Age of Acquisition), relative input and output in each language, and the context of early language experiences are associated with the strongest language and literacy outcomes. In the present study, vocabulary, reading, and grammar are measured in children across standardized measures as they together represent a collection of oral language and receptive literacy skills that predict academic achievement (Bleses et al., 2016).

Age of Acquisition

In the present study, a primary variable of interest in describing early bilingual experience is Age of Acquisition (AoA). AoA refers to the age of first exposure to a language. Researchers have frequently utilized AoA to understand its role in first and second language

learning, including in language and literacy development. In the following sections, we will describe how AoA may be related to vocabulary, grammar, and literacy outcomes in the mid to late elementary school grades given what is known about early development.

In a systematic literature review of language and literacy development, findings concluded differences in vocabulary development between simultaneous and sequential language learners, both of which are groups that differ in terms of their AoA of each language. For example, in Hammer et al. (2008;2014), preschool DLLs (both simultaneous and sequential) had an increase in vocabulary scores over the course of the next two years. Simultaneous learners were observed to begin Head Start with below-average English vocabulary and ended Head Start with a lower average as compared to their monolingual peers. Additionally, sequential DLLs were observed to have a faster rate of vocabulary development in Spanish and English than those simultaneous DLLs (Hammer et al., 2008; Hammer et al., 2014). Results suggest that in terms of vocabulary knowledge, DLLs (both simultaneous and sequential) develop their conceptual vocabularies at the same rate as their monolingual peers during early childhood (Hammer et al., 2014). However, when discussing vocabulary size, simultaneous and sequential preschool DLLs show individual differences when compared to their monolingual peers. Literature suggests that simultaneous DLLs have a slower trajectory for vocabulary development as compared to sequential DLLs when compared to their monolingual peers. Nonetheless, both groups make gains in their individual languages and catch up to their monolingual peers over time (Cummins, 1991; Hammer et al., 2014). Together it can be concluded that vocabulary development is different for DLLs as compared to their monolingual peers, but AoA may not necessarily be a strong predictor in overall vocabulary development well into the school-age period. In fact, by adulthood even differences between monolinguals and bilinguals in vocabulary are very small

(Bialystok & Luk, 2012). In the present study, we will examine how AoA predicts vocabulary in school-age DLLs past the kindergarten and elementary school period. Similar to vocabulary, additional research on factors predicting literacy skills in school-age bilinguals at later grades is needed. In a study that examined preschool DLLs' early emergent literacy skills, results revealed that transfer of skills in Spanish predicted variance in English (Anthony et al., 2009). Results suggest that the preschool DLLs in this study showed the strongest predictor for transfer was prior emergent literacy skills in their dominant language, a finding that has been replicated by other studies of children in early elementary grades (Feinauer et al., 2013). These studies suggest that AoA is not a consistent and robust predictor for literacy skills. When examining the results of multiple longitudinal studies and literature reviews, research determined that AoA can influence grammatical acquisition after the age of 4 (Herschensohn, 2007; Peña, 2012). Before this age, grammatical acquisition is similar enough across both languages that knowledge of the child's first and second language has a higher chance of transfer for language skills such as syntax (i.e., word order, functional categories).

Reported associations between AoA and language and literacy skills in young children warrants hypothesis about associations for DLLs 11-13 years of age in the present study. Like (Peña, 2012), we hypothesize within cross-language associations. Within Spanish and English, we expect that an earlier AoA will result in a positive correlation with proficiency outcomes in both Spanish and English. For within language associations, we expect that an earlier AoA in Spanish will also yield positive cross-language correlations resulting in stronger language and literacy proficiency in English and vice versa. However, AoA has not always proved to be a robust predictor of vocabulary development (Bedore et al., 2016). Rather other factors such as early childhood contexts including exposure to and use of the language in addition to the

learning environment have proven to be stronger predictors of DLLs language and literacy which will be discussed in the following sections.

Current Language Input vs. Current Output

Our second variable of interest is current language input vs. current output. For this study, current language input refers to the relative amount of each language a child presently accesses and receives daily. Alternatively, current language output refers to the relative amount of each language a child uses expressively. According to a critical review by Hammer et al., (2014), there are gaps in literature about factors that influence DLLs language and literacy development. However, two key roles that play a significant factor are the amount of language exposure (input) and usage (output). In a different study that looked at children's receptive language growth in Spanish and English, findings revealed that preschool DLLs with language exposure that began prior to Head Start, had higher English receptive vocabulary and language comprehension abilities than those DLLs who had a shorter length of exposure (Hammer et al., 2008). Findings suggest that language input is a strong predictor of DLLs' language and literacy skills. Like Hammer (2008), in a study that looked at early language experiences as a predictor of language processing and vocabulary, findings revealed that the amount of exposure to child-directed speech was a strong predictor for processing efficiency allowing them to identify vocabulary words in real time at a much quicker rate than those children who were less exposed to child-directed speech (Weisleder & Fernald, 2013). Based on the literature considered, we expect that a higher percentage of current input will subsequently result in a higher percentage of output creating strong within and cross-language linear associations in Spanish and English.

Qualitative Language & Literacy Learning Experiences

Our last variable of interest describes the qualitative language and literacy learning experiences and contexts that contribute to children's learning. For example, children may be exposed to two languages, but they may be learning them in different environments and from different conversational partners. The social context of conversations with adults and family are different than those conversations with peers and friends. For this study, we looked at such contexts of learning Spanish and English. Specifically, this study measured the degree to which parents' perceptions of oral language interactions with family vs. friends and reading experiences in Spanish and English were associated with observed language and literacy skills in DLL children.

While many experiences may contribute to a child's language and literacy outcomes, research has shown that one of the most influential factors of early language experiences includes the home environment (Lewis et al., 2016). Various studies discuss the home environment and family constellation as a source of prediction for bilingual development. For example, literacy experiences in the home can influence oral comprehension abilities of language production (Lewis et al., 2016). In another longitudinal study that looked at family support effects on second language attainment of children who were exposed to German, English, and French, findings revealed that biliteracy was strongest children had family involvement and encouragement (Pfenninger & Singleton, 2018). While research notes that family and home environment can support literacy, research also shows that qualitative experiences can be linked to language skills such as vocabulary development. In (Weisleder & Fernald, 2013), results revealed that child-directed speech in Spanish-speaking families had a direct influence on real-time language processing and vocabulary learning. Those children who were exposed to more

child-directed speech were more efficient in processing familiar words and were deemed to have larger expressive vocabulary. Based on these findings, qualitative language and learning experiences are strong predictors of vocabulary, reading, and grammar. To further extend these findings, we expect that children's reported oral language experiences with family and friends and children's reading experiences as a contributor to their learning in Spanish and English will present within cross-language associations. We predict that children with higher reported levels of oral language experiences with family and friends in addition to highly rated reading experiences in both Spanish and English will create strong within-language associations. Additionally, we expect that children's experiences in English will support Spanish and vice versa.

The Present Study

The present study seeks to examine qualitative language and literacy learning experiences (e.g., AoA, current language input vs. current output, and language and literacy learning experiences) to examine their role in supporting the strongest language and literacy outcomes in Spanish and English. The purpose of this study is to extend the available literature on DLL children. Specifically, we are looking to extend findings on English-dominant school-aged children. Bilingualism is considered a continuum and English-dominant school-aged children are understudied, with most research focusing on Spanish sequential learners or those with Spanish dominance. This study seeks to gather meaningful findings to educate caregivers, professionals, and the community on the early experiences that affect language and literacy proficiency and can support DLLs in their academic achievement when English is their dominant language.

To summarize, this study investigates three questions. How does AoA correlate with language proficiency across standardized language and literacy measures of vocabulary,

grammar, and reading? To what degree does current language input vs. current language output correlate with language proficiency across language and literacy measures? What are the associations between qualitative language and literacy learning experiences (i.e., oral language experiences with family and friends, children's reading experiences) and language proficiency when looking at language and literacy measures of vocabulary, grammar, and reading?

Method

Participants

A total of 17 Spanish-English bilingual speakers participated in the present study. Participants were aged between 11–13 years of age. See specific demographic information in Table 1 below. One participant was excluded from the study due to insufficient demographic information provided.

Participants were recruited through the University of Iowa Communication Disorders and Sciences department. A mass email was sent to the University of Iowa and nearby communities to inform the public of the study. Recruitment targeted local Spanish-English dual language immersion program in Iowa. The preliminary data in this study was collected from Marshalltown. Marshalltown is a dual language enrichment program that operates on a 50-50 language model where half of the instruction is in Spanish and the other half is in English. Students focus on areas of Spanish literacy and Math, while the English portion focuses on English literacy with Science and Social Studies. The data presented here represents students from the same school. Inclusion criteria required child participants to be between 11-13 years old and who are bilingual speakers of Spanish and English. Child participants were identified by their parents as "Caucasian" with the exception of one who identified as "Hispanic". Additionally, participants were screened for no history of neurological disorders and had typical or corrected to normal vision and hearing through language history and demographic questionnaires that were given to caregivers of the child participants. Participant sex was evenly split between females (n = 9) and males (n = 8). As shown in Table 1, as a group, participants were English-dominant based on parent ratings of proficiency in understanding, speaking, writing, and reading. All parents of the child participants reported some level of college or

graduate school except for one parent who reported 7th grade schooling.

Table 1. *Participants' Demographics*

Participant Characteristics	N (%)	English: M(SD)	Spanish: M(SD)
Females	9 (52%)		
Males	8 (47%)		
Proficiency Understanding		8.82 (1.21)	7.71 (1.21)
Proficiency Speaking		8.76 (1.15)	7.71 (1.14)
Proficiency Reading		8.41 (1.69)	7.59 (1.69)
Proficiency Writing		7.35 (1.46)	7.18 (1.43)

Note: The numbers in the table represent ages in months for both English and Spanish

Language Experience

Within this study, independent variables describing qualitative language and literacy learning experiences were selected from a language history questionnaire. The variables selected were AoA in Spanish and English, current language input vs. current output, and qualitative language and literacy learning experiences in Spanish and English. Questions from language and literacy experiences were derived from the Bilingual English- Spanish Assessment (BESA) and the Language Experience and Proficiency Questionnaire (LEAP-Q). The BESA is an assessment form that helps professionals understand the context in which the child is learning two languages on a year-to-year basis (Peña et al., 2018). Within the BESA, there is a Bilingual Input-Output Survery (BIOS) which seeks to understand the child's relative use and exposure to each individual language. In addition, the LEAP-Q is a validated questionnaire tool intended to collect

self-reported proficiency and experience from multilingual speakers (Marian et al., 2007). The Center for Early Care and Education Research- Dual Language Learners (CECER-DLL) questionnaire was also consulted. The CECER-DLL is a parent-teacher questionnaire that was created to capture information on bilingual children's language experiences and was validated for this population (Hammer et al., 2022). At the time this data was collected, there was no single measure that encapsulated all the information needed and questions from both the BESA (BIOS), LEAP-Q, and CECER-DLL were adapted to help inform the context in which these bilinguals were using Spanish and English.

Age of Acquisition

Firstly, we were interested in AoA in both Spanish and English. To better understand the timeline of the child participants' language acquisition, caregivers were asked to indicate the age (in months) that their child began to hear, speak, and read in each language. If there was another language other than Spanish and English that their child had been significantly exposed to (more than 2 hours per week), they were asked to please list it below under "other" (see Appendix). As shown in Table 2 the average AoA for hearing in English was 0 months, while the average AoA for hearing in Spanish was 46.81 months. The average AoA for speaking in English was around 12.76 months whereas in Spanish the average was around 54.11 months of age describing a sample of sequential bilingual language learners. Lastly, the average AoA for reading in English was around 55.82 months, and 62.88 months in Spanish.

Current Language Input vs Current Output

Our second variable of interest was the child's current language input and their current language output. As noted in Bedore (2016), current input and current output percentages can often account for at least 65% of language variance in school-aged children. In this study,

caregivers were asked to think about their child's current language exposure and language use to quantify their language experiences. The question asked caregivers to list the percentage of time their child is currently exposed to Spanish and English on average. Then, caregivers were asked to list the percentage of time their child currently uses or speaks in Spanish and English on average (see Appendix). As shown in Table 2, a majority of participants received substantially more language input in English than in Spanish and provided more language output in English than in Spanish.

Qualitative Language & Literacy Learning Experiences

Our third variable of interest was the child's qualitative language and literacy learning experiences. To gather deeper understanding about the children's language and literacy learning experiences, caregivers were asked to rate how language and literacy factors contributed to their child learning English and Spanish on a scale from 0-10 (see Appendix). Table 2 below shows that caregivers reported high numbers of language learning contribution across family, friends, and reading in English indicating a language dominance in English. When looking at their reported numbers of contribution in Spanish, reading and friends provided the most contribution and caregivers reported significantly lower numbers of reading exposure in Spanish.

Table 2. *Parents' Perception/Ratings about Qualitative Language and Literacy Experiences*

Participant Characteristics	English Average (SD)	Spanish Average (SD)
[1]Age of Acquisition (Hearing)	0 (0)	46.81 (20)
[1]Age of Acquisition (Speaking)	12.76 (23.79)	54.11 (23.56)
[1]Age of Acquisition (Reading)	55.82 (16.18)	62.88 (16.05)
[2]Current Input	.65 (.22)	.35 (.22)
[2]Current Output	.69 (.25)	.31 (.25)
[3]Friends Contribution	7.41 (1.97)	6.35 (1.94)
[3]Family Contribution	8.94 (4.17)	1.94 (4.27)
[3]Reading Contribution	7.06 (2.26)	6.88 (2.24)

Note: The numbers in the table represent ages in months for both English and Spanish
[1] This variable was measured in months
[2] This variable was measured by percentage (0-100 %)
[3] This variable was measured by a rating scale 0-10

Language and Literacy

Vocabulary. Vocabulary refers to the body of words that are used within an individual's language. To measure vocabulary, the Test de Vocabulario en Imagenes Peabody (TVIP) and the Peabody Picture Vocabulary Test (PPVT) which are norm referenced measures of receptive vocabulary were identified as appropriate measures to capture the receptive vocabulary of the DLLs in this study.

Vocabulario en Imagenes Peabody: TVIP.

The TVIP is a translated version of the PPVT and is also used to measure Spanish-speaking or bilingual children's receptive vocabulary. However, the TVIP is normed for individuals ages 2:6- 17:11 years of age (Dunn, 1986). The TVIP is given verbally and there is no reading required on the participant. The administrator reads vocabulary words, and the student matches that word by pointing to one of four numbered images that appear on a single card or by saying the image's corresponding number. Standard scores were used for analysis of vocabulary proficiency.

Peabody Picture Vocabulary Test: PPVT.

The PPVT is a norm-referenced measure of receptive vocabulary based on Standard American English. It is normed for individuals ages 2:6-90+ years of age and is administered individually (Dunn, 1965). Administration of the PPVT is the same as the TVIP. The PPVT is given verbally and there is no reading required on the part of the participant. The administrator reads vocabulary words from a predetermined list and the student matches that word by pointing to one of four numbered images that appear on a single card or by saying the image's corresponding number. Standard scores were used for analysis of vocabulary proficiency.

Reading. Child participants were given the "reading cluster" subtest of both the Woodcock-Muñoz (WM) and Woodcock-Johnson (WJ) Tests of Cognitive Abilities. Both subtests measured the individual's letter-word identification skills and their ability to apply phonics/decoding skills to unfamiliar words (word attack).

Woodcock-Muñoz.

The WM is standardized for individuals ages 2-22:11 years of age and is based on a sample of native Spanish speakers from a larger sample of 7,416 individuals used for the WJ battery (Muñoz-Sandoval et al., 2009). Administration for the "word attack" subtest requires the

participant to produce sounds for single letters and use phonic skills to pronounce unfamiliar words. Then, the remainder of items require the participant to read letter combinations aloud that are phonically consistent with patterns in Spanish orthography. Standard scores were used for analysis of reading proficiency.

Woodcock-Johnson.

The WJ is a standardized norm-referenced battery that captures an individual's general intellectual abilities, academic achievement, and specific cognitive abilities in people ages 2:0-90+. The WJ is based on a single sample that included the standardization of over 7,000 individuals ranging from ages 2-90+ years. Demographic characteristics are closely matched to that of the general U.S. population (Mathers et al., 2016). Administration of the WM subtest for the letter-word identification entails the participant to read words aloud from a vocabulary list that becomes progressively more difficult. Administration for the "word attack" subtest requires the participant to produce sounds for single letters and use phonic skills to pronounce unfamiliar words. Then, the remainder of items require the participant to read letter combinations aloud that are phonically consistent with patterns in English orthography. Standard scores were used for analysis of reading proficiency.

Grammar. Grammar refers to the system and structure of a language and consists of syntax, morphology, pragmatics, and semantics. Grammatical development is an essential component of language and literacy achievement. Without it, an individual's ability to relay information and also understand information is impacted. Furthermore, an individual's ability to recall or imitate sentences is a strong indicator of grammatical ability (Menyuk, 1964). Given that grammar is a critcal piece to language development, child participants were given the

Clinical Evaluation of Language Fundamentals 4-Spanish (CELF-4) and the Clinical Evaluation of Language Fundamentals 5th Edition (CELF-5) to assess the participants' grammar.

Clinical Evaluation of Language Fundamentals 4-Spanish (CELF-4).

The Clinical Evaluation of Language Fundamentals 4-Spanish (CELF-4) is a standardized measure that was created to assess Spanish-speakers living in the United States as a parallel test to the English edition of the CELF-4 (Wiig, Semel, & Secord, 2006). However, the CELF-4 is not a direct translation of the CELF-4 English test and seeks to include themes familiar to Spanish speakers. For this study, the subtest for "recalling sentences" also known as the "recordando oraciones" was used with both raw and standard scores being considered. Similar to PPVT and TVIP, the administration of CELF English and CELF Spanish is similar. For the "recordando oraciones" subtest, the administrator read aloud the sentences and participants were asked to repeat. Scores were given based on the correct repetition without omission or substitution of any words. Scaled scores were used for analysis of grammar proficiency.

Clinical Evaluation of Language Fundamentals 5th Ed. (CELF-5).

The CELF-5 is a standardized battery utilized for individuals ages 5:0- 21:11 years, and the "recalling sentences" subtest was used for the present study. The CELF-5 is normed on English-speaking individuals from the United States (Wiig, Semel, & Secord, 2013). The administration required the research assistant to a sentence aloud and ask the child to repeat. A score is given based on the repetition the child made without any omission or substitution of words. Scaled scores were used for the analysis of grammar proficiency.

Table 3. *Standardized Measures for Vocabulary, Grammar, and Reading in Spanish*

Measures (Spanish)	Average	SD
[1]TVIP	105.18	16.25
[2]CELF-4	7	1.67
[1]WM (word attack)	106.12	10.03
[1]WM (letter-word identification)	102.30	11.39

Note: TVIP (Test de Vocabulario en Imagenes Peabody), CELF-4 (Clinical Evaluation of Language Fundamentals 4-Spanish), WM (Woodcock-Muñoz)
[1]This measure has a mean standard score that is 100 and has a standard deviation of 15
[2]This measure used total raw scores for each test and are on a normed scaled score of 10 and a standard deviation of 3

Table 4. *Standardized Measures for Vocabulary, Grammar, and Reading in English*

Measures (English)	Average	SD
[1]PPVT	109.47	11.19
[2]CELF-5	11.06	2.34
[1]WJ (word attack)	106.82	7.14
[1]WJ (letter-word identification)	104.35	8.32

Note: TVIP (Test de Vocabulario en Imagenes Peabody), CELF-4 (Clinical Evaluation of Language Fundamentals 4-Spanish), WJ (Woodcock-Johnson)
[1]This measure has a mean standard score that is 100 and has a standard deviation of 15
[2]This measure used total raw scores for each test and are on a normed scaled score of 10 and a standard deviation of 3

Procedures

Research assistants were trained to collect data with children in a single session with short breaks if required. Child participants were invited alongside their caregivers for the following procedures. First, consent and assent were obtained from the caregiver and the child participant, respectively. Caregivers were then given a demographic questionnaire to provide

information about the child's socioeconomic status (SES, language history variables, and proficiency based on a scale 0-10). After documents were filled out, the child engaged in language testing which lasted approximately 1-1.5 hours. Administration of language and literacy measures were completed by bilingual Spanish-speaking and English-speaking research assistants in the lab. Participants were given measures of vocabulary, grammar, and reading in that order. Half of the children were tested in English and then Spanish, while the other half were given measures in Spanish and then English.

Data Analysis

To answer our research questions, we conducted a series of correlations. For this study, correlations refer to the degree to which two variables are linearly related and can indicate possible associations. Correlations were used for this study because evaluated the association between two variables in turn (i.e., early language and literacy learning experiences, standardized measures of vocabulary, grammar, and reading) and we wanted to understand their linear associations. By understanding how these variables are linearly associated, we gather preliminary associations about how early experiences support bilingual language development in bilingual English-dominant school-aged children.

Research Question 1

Our first question examined how AoA for hearing, speaking, and reading in both Spanish and English was correlated with language proficiency across standardized language and literacy measures (see Table 3). Participants all had an AoA of 0 for the age at which they began hearing English and therefore this variable was not included in the table of correlations as there was no variance in this measure. AoA results revealed positive correlations between AoA in reading English and grammar scores in Spanish as measured on the Woodcock-Muñoz (r(15) =.52, p=.03), meaning a later age in learning to read in English was correlated with stronger grammatical skills in Spanish. No other correlations were significant.

Table 5. *Correlations between AoA and Language and Literacy Scores*

	AoA_SP Hearing	AoA_SP Speaking	AoA_SP Reading	AoA_EN Speaking	AoA_EN Reading
Reading_SP	r(15)=.03, p=.91	r(15)= -.10, p=.70	r(15)=.29, p=.26	r(15)=.29, p=.25	r(15)=.25, p=.34
Reading_EN	r(15)=-.11, p=.67	r(15)=-.03, p=.91	r(15)=-.07, p=.79	r(15)=.33, p=.20	r(15)=.30, p=.24
Vocab_SP	r(15)=-.26, p=.30	r(15)= -.09, p=.73	r(15)=.11, p=.69	r(15)=.01, p=.98	r(15)=.06, p=.82
Vocab_EN	r(15)= -.16, p=.52	r(15) = .12, p=.66	r(15)=.26, p=.32	r(15)= -.19, p=.46	r(15)=.08, p=.75
Grammar_SP	r(15)=-.26, p=.31	r(15) =.03, p=.99	r(15)=.29, p=.26	r(15)=-.01, p=.96	**r(15)=.52, p=.03**
Grammar_EN	r(15)=-.19, p=.46	r(15)=.18, p=.50	r(15)=.26, p=.31	r(15)=.14, p=.59	r(15)=.31, p=.22

Note: SP (Spanish), EN (English), Vocab (Vocabulary), AoA (Age of Acquisition); correlations for AoA in English (hearing) were not included due to lack of variance in this variable

Research Question 2

Our second question examined the linear relationship between the degree of current language input versus current output and its influence on language proficiency across language and literacy measures (see Table 4). Results revealed that output in English was positively associated with reading in Spanish as measured by the Woodcock-Muñoz (r(15)=.71, p=<.001), whereas output in Spanish was negatively correlated with reading in Spanish (r(15) = -.71; p<.001). These correlations are likely driven by the overwhelming English dominance of the participants who learned English at birth but Spanish a few years later, and we will discuss this in more detail in the discussion.

Table 6. *Correlations between Current Language Input and Output and Language and Literacy scores*

	Input_Sp	Input_En	Output_Sp	Output_En
Reading_SP	r(15)=.03, p=.92	r(15)= -.03, p=.92	**r(15)=-.71, p=<.001**	**r(15)=.71, p=<.001**
Reading_En	r(15)= -.08, p=.76	r(15)=.08, p=.76	r(15)= -.21, p=.42	r(15)=.21, p=.42
Vocab_Sp	r(15)= -.12, p=.65	r(15)=.12, p=.65	r(15)= -.07, p=.79	r(15)= .07, p=.79
Vocab_En	r(15)= -.14, p=.59	r(15)=.14, p=.59	r(15)= -.38, p=.13	r(15)=.14, p=.59
Grammar_Sp	r(15)=-.35, p=.16	r(15)=.35, p=.16	r(15)=-.35, p=.17	r(15)=.35, p=.17
Grammar_En	r(15)=-.46, p=.06	r(15)=.46, p=.06	r(15)=-.38, p=.13	r(15)=.38, p=.13

Note:bold denotes significant correlations at p< .05; SP (Spanish), EN (English), Vocab (Vocabulary)

Research Question 3

Our last question examined the linear relationship between parents' perceptions of how contributions of different qualitative language and literacy learning experiences (i.e., oral language experiences with family and friends, children's reading experiences) as a contributor to

learning English and Spanish correlated with language and literacy measures (see Table 5).

Results revealed a positive correlation between children's Spanish vocabulary size (as measured on the TVIP) and the degree to which parents' perception of Spanish input from family was a contributor to learning ($r(15) = .54$, $p=.02$). Furthermore, results demonstrated a marginally significant positive correlation between parents' perception of language input from family in Spanish and grammar in Spanish as measured by the CELF ($r(15)=.47$, $p=.06$). Notably, parents' perception of input from friends in Spanish and English was not significantly correlated with reading. Parent perception of reading experiences as a contributor in Spanish were noted to have a marginally significant correlation with reading scores in Spanish and English as measured by the WM and WJ ($r(15)=.45$, $p=.07$; $r(15)=.43$, $p=.08$). Additional marginally significant correlations were found between parents' perception of reading experiences as a contributor in English with vocabulary scores in Spanish as measured by the TVIP ($r(15)=.45$, $p=.07$).

Table 7. *Correlations between Qualitative Language and Literacy Experiences and Language and Literacy Scores*

	Friends_SP	Friends_EN	Fam_SP	Fam_EN	Reading Exp_SP	Reading Exp_EN
Reading_ SP	r(15)=.07, p=.79	r(15)=.33, p=.19	r(15)=.04, p=.87	r(15)=.33, p=.19	r(15) =.45, p=.07	r(15)=.16, p=.55
Reading_ EN	r(15)=.03, p=.92	r(15)=.33, p=.19	r(15)=.37, p=.15	r(15)=.18, p=.50	r(15) =.43, p=.08	r(15)=-.01, p=.96
Vocab_SP	r(15)=.04, p=.88	r(15)=.18, p=.50	**r(15)=.54, p=.02**	r(15)=.05, p=.86	r(15)=.13, p=.63	r(15)=.45, p=.07
Vocab_E N	r(15)=-.15, p=.58	r(15)=-.27, p=.29	r(15)=.33, p=.19	r(15)=-.27, p=.29	r(15)=-.13, p=.62	r(15)=.20, p=.45
Grammar_ SP	r(15)=-.44, p=.08	r(15)=-.38, p=.14	r(15)=.47, p=.06	r(15)=-.38, p=.14	r(15)=.15, p=.54	r(15)=-.19, p=.46
Grammar_ EN	r(15)=-.29, p=.26	r(15)=-.38, p=.26	r(15)=.25, p=.32	r(15)=-.38, p=.26	r(15)= -.01, p=.96	r(15)= -.18, p=.48

Note: SP (Spanish), EN (English), Vocab (Vocabulary), Exp (Experience)

Discussion

The present study explored the associations between early language experiences and language proficiency as measured by language and literacy measures. In this study, child participants between the ages of 11-13 were given standardized measures in vocabulary, reading, and grammar. Children's early language experiences were captured through a language history questionnaire which were filled out by caregivers of the child participants. In the sections below we discuss the results for each research question of interest.

Age of Acquisition

The first question examined how Age of Acquisition (AoA) was correlated to language proficiency across standardized language and literacy measures. In general, we did not find an association between AoA and vocabulary, reading, and grammar in Spanish and English. However, we did find one association for AoA reading in English which was positively correlated with grammar in Spanish. This indicates that learning to read in English at a later age was associated with stronger grammar skills in Spanish (as measured on the CELF-4). The positive cross-language association likely reflects that children who learned to read in English later in life likely had extensive Spanish language experiences before then, though this does not replicate within-language. Findings in previous literature showed AoA influences children's grammatical acquisition (Herschensohn, 2007; Peña 2012). However, given that there were no significant associations found besides the one correlation reported, we suspect one of two possibilities. We first suspect that a small sample size impacted our ability to make strong conclusions about AoA and language proficiency. Secondly, we suspect a possible cross-language association, but given the limitations of the data collected, more meaningful statements about cross-language associations cannot be made. However, we found that current language

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input and output revealed much meaningful findings allowing us to make better-informed statements of cross-language associations which will be discussed in the following section.

Current Language Input vs Current Output

Our second question explored the degree to which current language input vs. current language output was linearly associated with language proficiency across language and literacy measures. Unlike AoA, children's current language input and output as reported by caregivers yielded much more robust correlations for within and cross-language associations. In general children's current output did not show significant associations with children's language proficiency. However, reported percentages of output in English were strongly correlated with children's reading in Spanish resulting in higher scores on the CELF-4. This is congruent with findings in Anthony (2009) and Cumin (1981) that DLLs' phonological awareness in their dominant language supports development in their second language, which may also explain the negative association between output in Spanish and reading in Spanish in this English-dominant group of children. Furthermore, children's reported current language input in Spanish and English had a positive correlation with DLLs grammar skills in English yielding higher scores on the CELF-5, though this was marginal. This means that in this English-dominant group of children, those who were receiving more English input had higher grammatical outcomes in their dominant language (English), and more Spanish input was associated lower English grammar scores.

Given that children's current language input and output were collected as proportions on a scale of percentages, the inverse association is logical and consistent with prior research. The fact that current language input only had strong associations in children's grammar in English reflects possible variability in this relatively homogenous group of children who are benefitting

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from dominant language input in English. Recall that these children identified as English dominant speakers with higher English input and output, earlier AoA, than Spanish. There was also overall less variance in Spanish experiences such that children had a smaller standard deviation of .22 (input) and .25 (output) in Spanish compared to English. The greater variability in English outcomes and language input make it easier to detect a possible association.

The findings also reveal the differential pattern of associations between input and language and literacy skills. While greater input seems to be correlated with grammatical outcomes in the dominant language, input was not associated with vocabulary and literacy. This is congruent with findings from Mancilla-Maritnez and Vagh (2013) which revealed that English vocabulary had a faster growth rate than Spanish regardless of the child's current use and exposure further confirming that DLLs language input and output are not always correlated with measures like vocabulary. Similarly, more language input alone does not support reading outcomes, which is consistent with literature showing that it is specific literacy experiences that are most predictive (Farver, Xu, Eppe, & Lonigan, 2006; Farver, Xu, Lonigan, & Eppe, 2013).

Qualitative Language and Literacy Learning Experiences

Our last question examined the associations between parents' ratings on qualitative language and literacy learning experiences (i.e., oral language experiences with family and friends, children's reading experiences) as a contributor to learning Spanish and English and children's language proficiency when looking at language and literacy measures. In general, we did not find positive associations between parents' ratings on children's qualitative oral language experiences and its correlation to their grammar and reading. We did a find positive correlation between children's oral language experiences with family in Spanish and vocabulary in Spanish. This indicates that the parents who reported experiences with family in as a contributor in

Spanish supported their vocabulary scores when measured on a standardized assessment. These findings are consistent with research that we saw in studies such as Lewis (2016) where the language environment served as a variable predictor in bilingual language development. More specifically, DLLs vocabulary development and real-time language processing were heavily supported by child-directed speech in Spanish-speaking families as noted by Weisleder & Fernald (2013).

Limitations and Future Directions

Some of the limitations in our study include a small sample size and a relatively homogenous sample. Given that this study is a smaller part of a larger project, we were only able to use 17 participants because data collection is currently still on-going for this study. A majority of the child participants were English-dominant children whose families identified as white. Our intentions are to collect data from a more diverse sample. In addition, many of the children in this study came from a group of sequential Spanish bilinguals who were English-dominant. Future research aims to collect a total sample of 50 children from diverse language experiences. Lastly, given the preliminary nature of the analyses, we look forward to conducting more in-depth rigorous statistical methods when a sufficient sample size becomes available.

Conclusions

This study explored dual language and literacy learning experiences and their association with language and literacy measures in Spanish and English. Overall, we did not find significant correlations in children's AoA, their reported current language input and output, and their reported qualitative oral language experiences when correlated to their language and literacy skills. However, in the current group of English-dominant children, we did find some within and cross-language associations such as children's AoA reading in English being positively

correlated with grammar in Spanish, reported current language input in Spanish and English having a positive correlation with grammar skills in English, and reported oral language experiences with family in Spanish supporting children's vocabulary in Spanish. This allows us to further understand the unique nature of bilingual language development. Findings revealed that contextual factors such as qualitative language and literacy experiences may be linearly related to a child's language and literacy skills. In this study we were able to gather meaningful data about factors that support DLLs language skills, but future research must continue to understand the language experiences that support healthy bilingual language literacy development.

Appendix

Language Experience Questionnaire

<u>We are trying to understand your child's language learning history to both Spanish and English.</u>

Indicate the age (in months) that your child began to hear, speak, and read in each language. If there is a language other than Spanish and English that your child has been significantly exposed to (more 2 hours per week) please list it below under "Other".

	Hearing	Speaking	Reading
Spanish	_____ months	_____ months	_____ months
English	_____ months	_____ months	_____ months
Other:_____	_____ months	_____ months	_____ months

1. What variety of Spanish and English has your child been exposed to? What type of Spanish and English are family members, teachers, friends or others speaking to your child? You can report the dialect. If you are not sure about the dialect, report the region, country, or culture where the language was learned. (For example, there are differences between Puerto Rican and Mexican Spanish, and there are differences between English spoken in the Texas vs. English spoken in New York.)

Spanish varieties:	English varieties:

2. Compared to other bilingual or multilingual children at a similar age, rate your **child's current proficiency** in understanding, speaking, reading, and writing in each language on a scale from 0-10.
   None (0)
   Very low (1)
   Low (2)
   Fair (3)
   Slightly less than adequate (4)
   Adequate (5)
   Slightly more than adequate (6)
   Good (7)
   Very good (8)

Excellent (9)
Perfect (10)

	Understanding	Speaking	Reading	Writing
Spanish	Rating: _____	Rating: _____	Rating: _____	Rating: _____
English	Rating: _____	Rating: _____	Rating: _____	Rating: _____
Other: _____	Rating: _____	Rating: _____	Rating: _____	Rating: _____

3. Think about your child's current language exposure and use. List the percentage of time your child is **currently exposed** to Spanish and English on average. Then list percentage of time your child **currently uses or speaks** in Spanish and English on average.

	Current exposure (input)	Current use (output)
Spanish	_____%	_____%
English	_____%	_____%
Other:_____	_____%	_____%

4. Rate how much the following factors contributed to your child learning English and Spanish on a scale from 0-10.

None (0)
Very low (1)
Low (2)
Fair (3)
Slightly less than adequate (4)
Adequate (5)
Slightly more than adequate (6)
Good (7)
Very good (8)
Excellent (9)

Perfect (10)

	Interacting with friends	Interacting with family	Reading	School instruction	Watching tv	Listening to podcasts, radio, etc.
Spanish	Rating: _____	Rating: _____	Rating: _____	Rating: _____	Rating: _____	Rating: _____
English	Rating: _____	Rating: _____	Rating: _____	Rating: _____	Rating: _____	Rating: _____
Other: _____	Rating: _____	Rating: _____	Rating: _____	Rating: _____	Rating: _____	Rating: _____

5. Now, think back to your child's first 3 years of life. What proportion of time did the child receive **input** (not including TV or radio) that was in Spanish vs. English?

	Birth to age 1	Age 1 to 2	Age 2 to 3	Total 0-3
Spanish	_____%	_____%	_____%	_____%
English	_____%	_____%	_____%	_____%
Other: _____	_____%	_____%	_____%	_____%

6. How confident are you in your responses to this questionnaire?
   Not at all confident
   A little confident
   Confident
   Very confident

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