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Understanding the Microstructure and Macrostructure Narrative Skills of Bilingual Adolescents in Relation to Their Language Experience

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ABSTRACT

Purpose: Narratives have been a useful tool for evaluating language skills in young bilingual children. This study extends that work to bilingual adolescents by (a) describing their narrative skills and (b) evaluating the role of current language experience on measures of narrative micro- and macrostructure across Spanish and English.
Method: Sixty-five Spanish–English bilingual adolescents, ages 10–15 years, were administered the Test of Narrative Language (TNL) in English and Spanish. Language samples were transcribed and coded for elements of narrative microstructure. Parents provided information about participants' current language experience.
Results: Means and standard deviations were reported for microstructure composites, TNL comprehension subtests, and TNL production subtests in Spanish and English. Findings showed differential effects of current English experience on narrative performance across Spanish and English, such that experience significantly explained 12%, 10%, and 20% of the variance in participants' microstructure scores, narrative comprehension, and narrative production in Spanish, respectively. Language experience was unrelated to performance across all English narrative measures.
Conclusions: Findings suggest that continued use of Spanish may be important for bilinguals' maintenance of the home language during adolescence, particularly on narrative tasks that require bilinguals to produce Spanish. However, experience is insufficient to explain the variability in bilinguals' narrative skills across Spanish and English.

Approximately 21% of the school-age population in the United States has exposure to a non-English home language (Irwin et al., 2021). Spanish–English bilinguals account for the majority of these bilinguals, with about three quarters of Latinx children ages 5 years and older speaking Spanish at home (Krogstad & González-Barrera, 2020). While there is a growing body of research on the language skills of young bilingual children (e.g., Bedore et al., 2010; Gámez & González, 2019; Pearson, 2002), there is a gap in the literature regarding Latinx adolescents' language skills and use. Critically, this group is at risk of experiencing stereotyping, marginalization, and low academic expectations (Kiramba et al., 2020), which can have downstream effects on educational and professional attainment. A better understanding of the language development of Latinx bilinguals during adolescence may inform our educational practices and highlight the wealth of language skills that bilingual adolescents possess.

Narrative language samples are considered an authentic context for evaluating language skills (Winters et al., 2022), including bilingual language skills (Gibson et al., 2018). However, because bilinguals divide their experiences across multiple languages and contexts, their

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narrative language skills may appear to be less complex depending on their experience in the language of elicitation. Disentangling how bilingual adolescents' divided experiences across English and Spanish relate to their narratives, within and across languages, is an aim of this article.

Adolescent Language Development

The period of adolescence is defined as the time in an individual's life between the ages of 10 and 19 years (World Health Organization, 2022). While bilingual language research for this developmental stage is underexplored, extant work on monolingual adolescents' language development describes the ways that language skills continue to grow during adolescence and into young adulthood (Wallis et al., 2021). For instance, the extensive body of work by Nippold and colleagues (Nippold, 1998, 2000, 2007; Nippold et al., 2020; Nippold, Vigeland, Frantz-Kaspar, & Ward-Lonergan 2017) documents how the lexical system expands as adolescents learn additional words related to their social, home, and academic environments, with estimations that U.S. adolescents know around 60,000 different English words by early adulthood (Nippold, 1998). In the area of syntax, English-speaking adolescents use longer, more complex sentences that include a variety of clause types (e.g., adverbial clauses, relative clauses, and nominal clauses) to convey a message more accurately and specifically. Though these forms emerge early in childhood, in adolescence, individuals begin to master them to become more competent and fluent (Nippold, 1998).

The growth in language skills from childhood to adolescence is reflected in adolescent narratives. Evidence from monolinguals shows that adolescents engage in more complex telling of personal stories (Nippold, 2007). Narrative language sampling yields information about the speaker's language skills across both microstructure and macrostructure. Microstructure refers to the smaller parts of oral narration that call for the intentional selection of lexical items and morphosyntactic structures to retell the episodes of a story. Macrostructure refers to story elements (e.g., characters, plot, event sequence, problem/resolution, and conclusion) and can be assessed via narrative comprehension and production tasks (Nippold & Hayward, 2018; Nippold, Vigeland, & Frantz-Kaspar, 2017). Narrative skills are important to educational outcomes because they are associated with better school performance and improved social communication skills (Davidson et al., 2017).

Narrative Microstructure and Macrostructure Skills in Adolescence

A series of studies by Nippold and colleagues (Nippold et al., 2014, 2015, 2020; Nippold & Hayward, 2018; Nippold, Vigeland, & Frantz-Kaspar, 2017; Nippold, Vigeland, Frantz-Kaspar, & Ward-Lonergan, 2017) used fables to elicit narrative microstructure. In a recent study, Nippold et al. (2020) asked 80 adolescent participants to discuss a moral message embedded in narrative prompts. The syntactic complexity of younger (M_{age} = 13 years) and older (M_{age} = 16 years) participants was compared. Adolescents across both groups similarly employed complex syntax, as evidenced by nonsignificant group differences on mean length of C-units (an independent clause with its modifiers) and the inclusion of a variety of clause types. The same study also yielded lexical measures. Here, a developmental difference was observed between younger and older typically developing adolescents. On average, the older adolescents used a greater number of different words (NDW; M = 232 words) than the younger group (M = 128 words). Others have found similar evidence of a developmental effect in lexical diversity in narratives that does not seem to generalize to the morphosyntactic domain. Wallis et al. (2021) compared the narrative microstructure of typically developing monolingual younger (M_{age} = 13 years; n = 24) and older (M_{age} = 17 years; n = 20) adolescents. For this study, the examiner read two short stories aloud and participants were asked to share their thoughts on the stories. The two groups did not perform differently on measures of verbal productivity (total number of utterances, number of total words [NTW]) or syntactic complexity (mean utterance length); however, the older group produced a greater NDW, reinforcing the finding that adolescents gain more advanced and diverse word knowledge as they age.

Adolescents can also demonstrate their use of increasingly complex language in narrative tasks assessing both comprehension and production of narrative macrostructure (Nippold et al., 2015). Adolescents as young as 9–11 years old understand and tell stories that feature sophisticated elements of story grammar, including episodes that are organized by actions and driven by goals and that have casual interrelatedness between episodes (Trabasso & Nickels, 1992). This complexity reflects adolescents' growing ability to think abstractly, engage in hypothetical and deductive reasoning, make inferences, and synthesize information (Berman & Nir-sagiv, 2007; Schickedanz et al., 2001). Additionally, adolescence is marked by an increase in prosocial thinking, meaning that children go from thinking about the self, to expanding their consideration in the direction of others (Lerner, 2002). Theoretically, this supports narrative macrostructure in that adolescents are better able to elaborate on characters, goals, and actions with an evaluative lens (Ordóñez, 2004).

Bilingual Adolescents' Narrative Skills

There is a growing body of literature around bilingual children (Bedore et al., 2012, 2016; Paradis, 2010) and

bilingual adults (including heritage speakers; e.g., Montrul, 2010) that contributes to understanding bilingual developmental trajectories and outcomes. However, research on the language skills of bilingual adolescents between the ages of 10 and 19 years is limited. This lack of research can make it challenging to assess and interpret normative language performance for this demographic (Genesee et al., 2004; Sanchez et al., 2013). The evidence that is available suggests that bilingual adolescents' language development appears to be highly variable and heterogeneous in both micro- and macrostructure.

There are both similarities and differences in bilinguals' microstructure accuracy and productivity compared those of their monolingual peers. Pearson (2002) reported that Spanish–English bilingual fifth graders performed similarly to their monolingual peers in narrative microstructure (including mean length of utterance, NDW, number of total words, number of clauses). Others have found evidence of differences between monolinguals and bilinguals. In a study of 54 ninth-grade Spanish–English bilinguals, Ordóñez (2004) compared narrative microstructure to those of age-matched Spanish monolingual and English monolingual peers. The bilinguals' Spanish and English narratives had more tense errors and lower clausal density. In another study comparing the narratives of early adolescent Spanish–English bilinguals (n = 43) and English monolinguals (n = 38), Gámez et al. (2016) found that bilingual adolescents produce longer English narratives than monolinguals; however, this productivity came at a cost to their overall grammaticality. Similarly, the Spanish narratives of Spanish–Hebrew bilinguals (n = 39) in preschool through secondary school included a smaller range of clauses and more morphological and grammatical errors than those of their Spanish monolingual peers (Kupersmitt, 2004). These latter studies suggest that bilingual adolescents may still be developing their microstructure skills (Gámez et al., 2016) and that they may be "following a qualitatively different path from monolinguals" (Kupersmitt, 2004, p. 432).

With respect to macrostructure, bilinguals appear to include similar components of narrative macrostructure as their English-speaking monolingual peers. Pearson (2002) found that fifth-grade Spanish–English bilingual adolescents used story grammar no differently from their English monolingual peers, even as significant group differences were found on these measures in earlier primary grades. Subsequent work has replicated the finding that, by early adolescence (fifth grade), bilinguals' inclusion of story structure converges with that of their monolingual peers (Gámez et al., 2016), as they did not find significant group differences despite bilinguals producing longer narratives. Others, however, have found greater divergence. In their comparison of bilingual and monolingual narratives, Ordóñez (2004) concluded that monolingual groups differed from bilingual groups on measures of macrostructure (story components, agents/actions, event elaboration, cohesion). The narratives of the bilingual groups generally featured fewer descriptions of events, characters, and evaluative language about characters' actions than monolinguals.

One limitation of a methodology that compares the narrative skills of bilinguals with the narrative skills of monolinguals is that studies may report evidence of a "gap" without unpacking why that gap exists. Because bilinguals' language skills are divided across two languages, a focus on English language outcomes often underestimates their comprehensive linguistic ability and frames them as being at a deficit (Castilla-Earls et al., 2019; Hudley & Mallinson, 2013). This study takes a different approach to understanding individual differences in bilingual adolescents. Specifically, we describe experiential sources of variation in adolescents' performance in both English and Spanish.

Language Experience

Language experience is a robust predictor of bilinguals' linguistic skills within and across languages (Bedore et al., 2012, 2016). In the U.S. context, these patterns of language experience are often mitigated by academic instruction. Increased exposure and use of English through traditional U.S. schooling means that many bilinguals shift away from using the home language in favor of English (Kohnert, 2010). By adolescence, children of Latinx immigrants are reported to be more proficient in English than in Spanish (Tran, 2010).

Usage-based models of language acquisition, such as the Unified Competition Model (UCM; MacWhinney, 2001), predict that language outcomes are a product of the ways in which an individual interacts with language. Usage-based models emphasize the role of competition in the process of learning and using two languages (Paradis, 2010). The UCM posits that this competition occurs when the individual is tasked with selecting linguistic cues that will help them interpret or use the correct linguistic forms. Individuals will select the most salient form in their linguistic repertoire. Critically, language experience increases the "resonance" of these forms and allows them to be internalized. In addition to mere experience, the UCM highlights how socialization can influence linguistic outcomes; that is, isolation or inclusion in one's linguistic community may affect language perceptions, experience, and practice opportunities, resulting in more or less resonant and internalized language skills.

Albeit limited, evidence from bilingual adolescents suggests that the social context of language experiences also relates to their language skills (Soto-Corominas et al., 2020). Specifically, current use of English with friends

predicts variation in lexical and morphological abilities in English. The context and time spent speaking English in informal social situations plays a significant role in the later English language proficiency of first-generation, immigrant, 14- to 19-year-old adolescents (Carhill et al., 2008). This pattern extends to reading. Fifth- through seventh-grade adolescents who reported reading English more frequently scored higher in measures of English grammar than students who reported less frequent reading in English (Huang et al., 2017).

While we have begun to form a clearer view of how current experience relates to language outcomes in English, these variables have not been investigated in bilingual adolescents across both of their languages. In children, in the early stages of learning English, there is a documented temporary period of low grammaticality in both languages, as language proficiency shifts from the home language (in these studies, Spanish) to English (Anderson, 2004; Castilla-Earls et al., 2019; Jackson et al., 2014; Montrul, 2008). It is unclear, however, to what extent bilingual adolescent narrative language measures are associated with level of experience (both input hearing and output using) in each of their two languages.

Research Aims

Given that bilinguals comprise a significant portion of the U.S. school population, it is imperative to understand how bilingual adolescents perform on narrative tasks and to understand the contribution of language experience on performance. This study quantifies language experience using an hour-by-hour survey that measures the percentage of time during a typical week the bilingual hears and uses English versus Spanish. We seek to address the following aims:

1. to describe bilingual adolescents' performance on narrative language measures in English and Spanish,
2. to explore how language experience relates to bilingual adolescents' narrative microstructure in English and Spanish, and
3. to explore how language experience relates to bilingual adolescents' narrative comprehension and production in English and Spanish.

Method

Participants

Adolescent participants (N = 65) in this study were recruited from a larger study on Spanish–English bilingual adolescents. All participants lived in Texas and were between the ages of 10 and 15 years (M_{age} = 12.5 years, SD = 1.3). Gender was generally balanced, with 49.2% of participants identifying as female and 50.8% identifying as male. Participants were recruited from a dual immersion charter school system in central Texas, as well as at community events and from organizations serving Latinx families. The charter schools had recently begun implementation of dual immersion instruction, so the level of Spanish instruction varied across participants and grades. Demographic information about participants is displayed in Table 1. Of the original 129 participants in the larger study, we excluded 54 adolescents who scored in the clinical range (T > 63) on parent or child reports of internalizing and/or externalizing behaviors on the Youth Self Report and/or the Child Behavior Checklist from the Achenbach System of Empirically Based Assessment (Achenbach, 2010). We excluded these adolescents because internalizing and externalizing types of behaviors may co-occur with communication behavior in the absence of a language disorder due to adaptation difficulties or psychopathology (Chow & Hollo, 2021; Toppelberg et al., 2002). Additionally, we excluded participants (n = 10) who presented with risk for developmental language disorder (DLD) as indicated by parent report using the Inventory to Assess Language Knowledge (ITALK; Peña et al., 2018) and/or history of speech and language services. On the ITALK, parents are asked to rate their child's language skills in English and Spanish on a 5-point scale from 1 (*minimal proficiency*) to 5 (*high proficiency*) across

Table 1. Demographic information about participants.

Variable	(*N* = 65)		
	M	*SD*	Range
Age (in years;months)	12;6	1;3	10;1–15;3
Age of first English experience (in years)	3.20	2.26	0.00–9.00
Current English input (% weekly)	58.84%	15.74	22.00–92.43
Current Spanish input (% weekly)	41.16%	15.58	7.57–78.00
Current English output (% weekly)	59.83%	17.56	22.00–97.43
Current Spanish output (% weekly)	40.17%	17.63	2.57–78.00

five domains: vocabulary use, speech production, sentence production, grammatical proficiency, and comprehension. An average score below 4.2 in both languages is flagged as possible DLD risk. All participants who scored above 4.2 on the ITALK and who had no history of speech and language services were considered typical and were included in the study. One additional participant was excluded from Spanish analyses due to incomplete narrative data in Spanish.

Procedure

To recruit bilingual families, the research team attended school and community events in Central Texas (e.g., back-to-school events) in areas with high populations of Latinx residents. Researchers provided families with forms that described the study in English and Spanish, and interested parents gave permission to be contacted regarding their child's participation. Parents provided informed consent and permission for their child's participation, whereas adolescents provided assent. All research procedures were approved by the institutional review board at The University of Texas.

All adolescents were tested at their homes or at a university lab space by bilingual research staff familiar with administering standardized assessments of language. Adolescents completed tests in English and Spanish during the visit, whereas parents completed interviews about their child's language skills in English and Spanish, including their current exposure to both languages. All testing and interviews were completed within a 3-hr visit.

Measures

Language Experience Measure

The Bilingual Input–Output Survey. Parents completed the Bilingual Input–Output Survey (BIOS)-Home (Peña et al., 2018) to quantify language exposure and use of English and Spanish. The BIOS-Home is a parent questionnaire about language use that forms part of the Bilingual English Spanish Assessment (Peña et al., 2018). The BIOS-Home asks parents to indicate what language their child hears (input) and uses (output) on an hour-by-hour basis during a typical weekday and weekend day. The daily hours spent in each language are then extrapolated to the remaining days of the week and summed. The total number of hours of input in English in a typical week is divided by the total number of hours of input overall (English plus Spanish), yielding a percentage of time the child spends hearing English in a typical week. The inverse of this is the percentage of time the child spends hearing Spanish. For example, a child who hears English 70% of the time would hear Spanish the other 30% of the time. Note that while we named our input variable "English input," the variable contains information about children's input across both English and Spanish due to this inverse relationship. To measure output, the process is repeated, but parents report on the language the child was most likely to *speak*. Likewise, we named our output variable "English output," but the variable contains information about children's output across both English and Spanish. In our sample, English input and output were moderately correlated at $r = .70$ and, as such, were analyzed separately in all analyses. The BIOS-Home also asks parents to describe the context of their child's hourly language use, listing who the child is communicating with and what activity they are doing, as well as the age that the child was first exposed to English. Although the BIOS-Home has not been validated for adolescents, previous research shows that parents are able to reliably report on children's exposure with children up to 10 years old (Peña et al., 2020) and indirect parent report is commonly used to understand bilingual experience across the lifespan (Kašćelan et al., 2022; Paradis, 2010).

Note that the BIOS also includes a complementary BIOS-School questionnaire that is identical to the BIOS-Home but completed by teachers for the hours the child is in school. We did not collect BIOS-School responses, due to the infeasibility of consenting teachers. While recruitment was initiated at the school sites, all other procedures were completed outside of school, which lessened the burden on school staff and made the schools more agreeable to participate. Parents reported on which language their child heard and used at school, to the best of their knowledge.

Language Measures in Spanish and English

All language measures were obtained from narratives produced using the Test of Narrative Language (TNL; Gillam & Pearson, 2004) and the Test of Narrative Language–Spanish (TNL-S; Gillam et al., 2017). The TNL and the TNL-S are norm-referenced measures for children ages 5;0–11;11 (years;months) and serve as a metric of children's ability to comprehend and produce narrative stories. The TNL is administered in English but can be used to measure the English skills of Spanish–English bilingual children (Gillam et al.,2013). The TNL-S is an experimental test administered in Spanish that is parallel to the TNL, with similar testing structure and unique prompts for narrative elicitation. Though the TNL-S is not commercially available, there have been some validity studies (Peña et al., 2020), and preliminary data indicate good internal reliability with α values of .88 for the Narrative Comprehension subtest and .93 for the Oral Narration subtest (Anaya et al., 2018). This study uses the narratives that children heard and produced during administration of the TNL and TNL-S to yield three narrative

measures in each language: narrative microstructure, narrative comprehension, and narrative production.

Narrative microstructure. When the narratives that children produce using the TNL and TNL-S are analyzed using language sample analysis, these samples can provide information about children's narrative microstructure. In this study, three of the elicited narratives from the TNL were transcribed for language sample analysis in English (*McDonald's*, *Late for School*, and *Alien*) and three of the elicited narratives from the TNL-S were transcribed for language sample analysis in Spanish (*La Tienda*, *El Perro*, and *El Unicornio*). Narratives were audio-recorded and transcribed by trained research staff using Systematic Analysis of Language Transcription (SALT; Miller, 2016) following the modified C-Unit rules and conventions specified in the SALT manual.

In line with previous research on narrative microstructure (Miller et al., 2005; Pearson, 2002; Wallis et al., 2021), we conceptualized microstructure from participants' language transcripts using the following metrics: two measures of lexical productivity: (a) NTW and (b) NDW; three measures of clausal density: (c) mean length of utterance in words (MLU-w), (d) subordination index, and (e) number of main verbs; and, finally, a measure of grammaticality, coded as (f) percent grammaticality. SALT software automatically generates counts for NTW, NDW, and MLU-w. Percent grammaticality was derived by dividing the number of total utterances by the number of grammatical utterances. Number of main verbs was derived by a raw count of occurrences in the transcript. Raw scores for all microstructure metrics in English and Spanish are reported in Table 2. Raw scores were examined for normality, and all were determined to be normally distributed in each language (although there was borderline positive kurtosis in Spanish subordination index). Within each language, raw scores were converted to z scores and summed to create a language-specific microstructure composite, following prior research (Rezzonico et al., 2016). Both the Spanish microstructure composite (Cronbach's $\alpha = .84$) and the English microstructure composite (Cronbach's $\alpha = .83$) yielded good internal reliability.

TNL Narrative Comprehension. The TNL and the TNL-S feature two subtests: Narrative Comprehension and Oral Narration. In the Narrative Comprehension subtest, the participant listens to three stories and responds to corresponding comprehension questions about what they heard. The comprehension questions broadly ask concrete "who," "what," or "where" questions. For example, "What was the girl's name?" or "Where were the children when they talked to their mother about eating out?" On the English version of the TNL's Narrative Comprehension subtest, there are 40 maximum points distributed across 30 comprehension items. Items are scored 0–3, according to the criteria delineated in the protocol and manual. On the TNL-Spanish, there are 42 comprehension items and a total of 46 possible points. As with English, Spanish items are scored on a scale of 0–3 points.

TNL Oral Narration. The Oral Narration subtest elicits language using three narrative production tasks per language: a retelling of a story using no visual prompts, an oral telling of a story while the participant views a sequence of five pictures, and an oral telling while viewing a single picture. On the English subtest, there are 67 items for a total of 88 points attainable. Items are scored from 0–3 points according to the prescribed criteria delineated in the protocol and manual. On the Oral Narration subtest in Spanish, there are 60 items for a total of 89 points attainable, with items scored from 0 to 3 points. One of the prompts in the Oral Narration subtest asks the participant to retell a story that they heard in the Narrative

Table 2. Narrative language performance.

Variable	Spanish (n = 64)			English (N = 65)			t
	M	*SD*	Range	*M*	*SD*	Range	
Microstructure composite	0.00	4.50	–14.21–11.68	0.00	4.47	–9.32–11.78	0.00
Number of total words	293.51	133.88	23–870	358.98	129.08	168–907	
Number of different words	118.22	37.89	17–230	151.35	41.07	88–309	
MLU-words	7.51	1.21	4.60–10.50	8.49	1.32	6–11.6	
Subordination index	1.75	0.35	0.00–2.34	1.85	0.27	1.32–2.55	
Main verbs	69.35	31.80	0–183	76.63	25.34	34–168	
% grammaticality	81.28%	18%	0–100%	87.61%	9%	48.00–100%	
% narrative comprehension[a]	65.35%	11%	26.92–84.61%	78.53%	8%	55.00–95.00%	8.42***
% narrative production[b]	51.84%	13%	0–68.53%	59.96%	9%	38.88–82.22%	4.66***

Note. MLU-words = mean length of utterance in words; % grammaticality = percent grammaticality.

[a]Test of Narrative Language, Narrative Comprehension percent correct score. [b]Test of Narrative Language, Narrative Production percent correct score.

***$p < .001$, two-tailed.

Comprehension subtest, "Now tell the story back to me. Tell me everything you remember, even the things I just asked you. Try to say the story the same way I said it." The participants are given points for including specific target story elements and narrative details.

TNL Scoring

The TNL (Gillam & Pearson, 2004) is normed for children up to 12 years of age, which is younger than our participants' mean age. The TNL-S is currently under development, and preliminary norms are based on an experimental data set of 238 Spanish–English bilingual children between the ages of 6 and 15 years (Anaya et al., 2018; Gillam et al., 2017). For this study, we followed all raw scoring procedures outlined in the manuals for both the TNL and TNL-S. This stipulates summing the raw scores on the comprehension subtest for a single Narrative Comprehension composite score and summing the raw scores on the production subtest for a single Oral Narration composite score. However, we did not convert raw scores to scaled scores, given that normed standard scores were not available for the entire age range of our sample (note that a new edition of the TNL provides norms for adolescence through the age of 15 years; however, the TNL-2 [Gillam & Pearson, 2017] was not yet available for use during our data collection). Rather, we used percent correct as the variable in all analyses, as the total number of possible points differs across the TNL and TNL-S.

Transcription and Coding

Transcription was conducted in three stages to achieve reliability. In the first stage, audio-recorded language samples were transcribed by trained research assistants. In the second stage, 100% of transcriptions were reviewed for transcription errors by both research assistants and the first author. Errors were discussed in conference and corrected. Also in the second stage, research assistants added the microstructure codes that are not automatically generated by SALT (e.g., subordination index, main verbs, grammaticality). In the third stage, all transcriptions and codes were checked for error and corrected in conference alongside the research assistants.

Reliability

A random 25% of transcriptions and codes were reviewed by the first author. Formal reliability was calculated based on 16 language samples in each language. Reliability was calculated for subordination index, main verbs, and percent grammaticality, but not for indices that are automatically generated by SALT software (NTW, total NDW, mean length of utterance) or produced by TNL macrostructure comprehension and production subscores. Given that subordination index, main verbs, and percent grammaticality are continuous, agreement for all coded metrics was measured using intraclass correlation coefficient (ICC) as suggested in Koo and Li (2016) and Ranganathan et al. (2017). ICC estimates and their 95% confidence intervals were calculated using SPSS statistical package Version 23 (IBM Corp, 2021) based on a mean-rating (k = 2), consistency, two-way mixed-effects model (McGraw & Wong, 1996). For subordination index, main verbs, and percent grammaticality, confidence intervals were [81%,97%], [92%,99%], and [76%,97%], respectively, and indicate good-to-excellent reliability (Koo & Li, 2016).

Analytical Plan

For Aim 1, we reported means and standard deviations for age, English input, and English output, as well as our three narrative measures of interest in English and Spanish: microstructure, narrative comprehension, and narrative production. We conducted a paired-samples t test to evaluate cross-linguistic performance on all dependent variables. Finally, we conducted zero-order correlations to explore the bivariate relationships among age, language experience, and narrative scores in both languages. For Aims 2 and 3, hierarchical linear regressions were conducted to assess the unique contribution of English input and output on each narrative measure. For each regression analysis, age was entered into the model at Block 1 (to control for developmental effects); English input was entered into the model at Block 2; and English output was entered into the model at Block 3. Between each block, the goodness-of-fit of the model was noted by evaluating the change in R^2. A significant change in R^2 signaled that the addition of the independent variable at that block significantly improved the percentage of variance explained. No variables were removed from the analyses if the R^2 change statistic was not significant, as we were interested in the variance explained by our independent variables, collectively.

Results

Prior to analyses, central tendencies of all variables were examined, as well as adherence to assumptions for hierarchical linear regression. Narrative measures fell within normal limits for skewness and kurtosis, indicating normal distribution (Hair et al., 2010). Examination of histograms and QQ plots provided further evidence that our data had only small departures from normality, which should not prevent us from continuing with parametric statistical methods.

Aim 1: Describing Adolescents' Narrative Performance in Spanish and English

For our first aim, we sought to describe bilingual adolescents' performance on narrative language measures

in Spanish and English. Performance on narrative microstructure, narrative comprehension, and narrative production is graphed in Figures 1–3, respectively, with English performance plotted along the *y*-axis and Spanish performance plotted along the *x*-axis. Means and standard deviations for all narrative measures in Spanish and English are displayed in Table 2. Cross-linguistic performance on all dependent variables was evaluated using a paired-samples *t* test. No significant cross-linguistic differences were found on narrative microstructure; however, significant cross-linguistic differences were found on narrative production and narrative comprehension. Participants performed an average of 8.12% better (SD = 13.62) in English than Spanish on narrative production, $t(63)$ = 4.67, $p < .001$, and an average of 13.18% better (SD = 12.62) in English than Spanish on narrative comprehension, $t(64)$ = 8.43, $p < .001$. Visual inspection of Figures 2–3 illustrates the trend that participants in our sample performed significantly better in English than in Spanish on these measures, as the data are clustered in the top half of the graph, indicating higher scores in English. Bivariate correlations are displayed in Table 3 with significant relationships flagged. Note that age was not significantly related to performance in Spanish but was significantly and positively related to narrative comprehension in English (r = .30, p = .014). English input was significantly and negatively correlated to Spanish microstructure (r = −.33, p = .017) and narrative production (r = −.26, p = .05). English output was not significantly related to narrative performance in English but was significantly and negatively related to performance in Spanish across all three narrative outcomes (microstructure, $p < .01$; comprehension, p = .039; and production, $p < .001$). In our subsequent aims, we sought to better understand these relationships.

Aim 2: Predicting Narrative Microstructure in Spanish and English

For our second aim, we explored the contribution of language experience on narrative microstructure in Spanish and English. Age was controlled for in all analyses, even when it was not significant in a bivariate analysis, for consistency. Experience was conceptualized across two metrics: English input (as measured by parents' report of how much English and Spanish the child hears in a typical week) and current English output (as measured by parents' report of how much English and Spanish the child produces in a typical week). Recall that English input is the inverse of Spanish input, and English output is the inverse of Spanish output. Thus, a number greater than 50% indicates more experience in English versus Spanish, and a number less than 50% indicates more experience in Spanish than in English. The top half of Table 4 features

Figure 1. Performance on narrative microstructure.

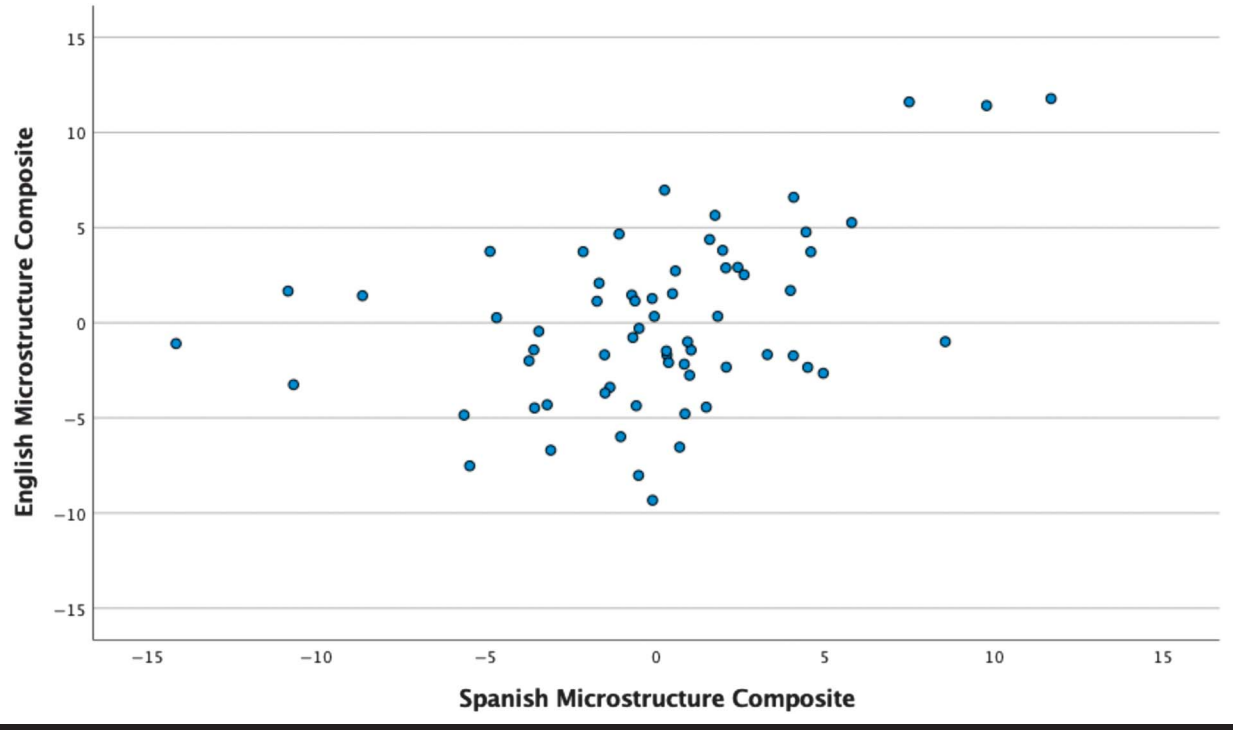
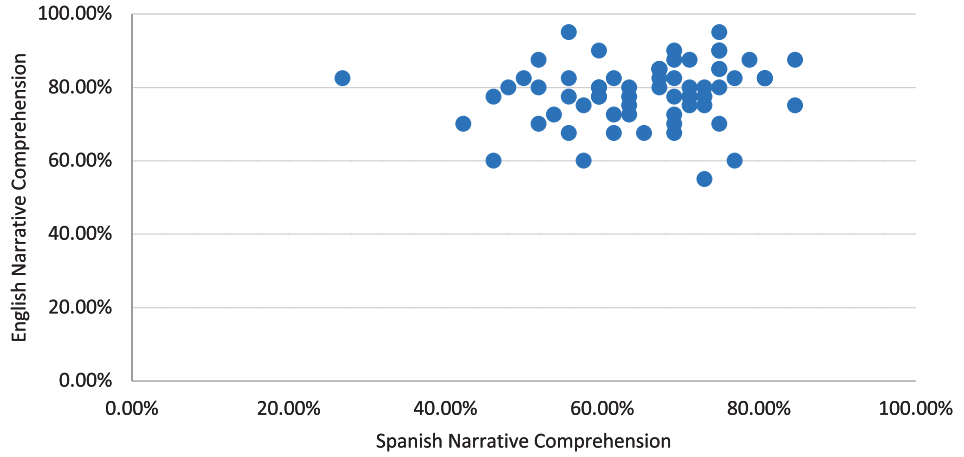


Figure 2. Performance on narrative comprehension.



the results of a hierarchical linear regression model with Spanish microstructure as the dependent variable. At Block 1, age was entered into the model to control for developmental effects, though it did not account for any variance in Spanish microstructure and was not significant, R^2 = .02 (adjusted R^2 = .02), $F(1, 63) = 2.53$, p = .117. At Block 2, English input accounted for 12% of additional variability in Spanish microstructure, signifying a significant addition of variance accounted for (adjusted ΔR^2 = .10), $F(1, 62) = 6.04$, $p < .01$. At Block 3, English output did not significantly account for any additional variance (adjusted ΔR^2 = .03), $F(1, 61) = 2.45$, p = .112. The resulting model with three independent variables was significant and accounted for approximately 16% of variability overall (adjusted R^2 = .12, p = .01) in adolescents' Spanish microstructure, with English input retaining individual significance. Thus, the lower proportion of time the adolescent spent hearing English in a typical week (i.e., the more time they spent hearing Spanish), the greater their Spanish microstructure scores.

English microstructure results are shown in the bottom half of Table 4. At Block 1, age did not significantly account for any variance (adjusted R^2 = −.01), $F(1, 63) = 2.15$, p = .645. At Block 2, English input did not significantly account for any additional variance (adjusted ΔR^2 = .01), $F(1, 62) = 0.539$, p = .466. At Block 3, the addition of English output did not significantly improve variance explained (adjusted ΔR^2 = .00), $F(1, 61) = 0.055$, p = .820. The final model explained no significant

Figure 3. Performance on narrative production.

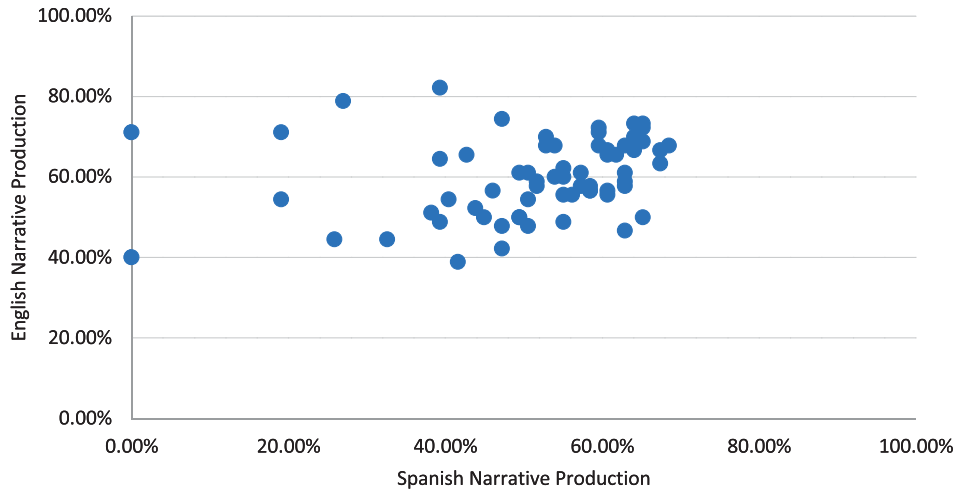


Table 3. Bivariate correlations: Effects of age and language experience on narrative performance.

Variable	Age	Current English input	Current English output
Spanish microstructure composite	–.20	–.33**	–.37**
Number of total words	–.19	–.24	–.24
Number of different words	–.15	–.26*	–.33**
MLU-words	–.07	–.18	–.15
Subordination index	–.22	–.24	–.27*
Main verbs	–.20	–.29*	–.31*
% grammaticality	–.06	–.26*	–.36**
Spanish narrative comprehension[a]	.12	–.13	–.26*
Spanish narrative production[b]	–.09	–.26*	–.43***
English microstructure composite	–.58	–.10	–.06
Number of total words	–.16	–.13	–.06
Number of different words	–.16	–.04	.02
MLU-words	.21	–.12	–.05
Subordination index	–.06	–.24	–.15
Main verbs	–.20	–.19	–.11
% grammaticality	.32*	.24	.06
English narrative comprehension[a]	.30*	.21	.22
English narrative production[b]	.06	.11	.01

Note. MLU-words = mean length of utterance in words; % grammaticality = percent grammaticality.
[a]Test of Narrative Language, Narrative Comprehension scaled score. [b]Test of Narrative Language, Narrative Production scaled score.
*$p < .05$. **$p < .01$. ***$p < .001$, two-tailed.

variability in English microstructure (adjusted $R^2 = -.03$, $p = .850$). Thus, the proportion of time an adolescent spent hearing or using English (vs. Spanish) was not significantly related to their English microstructure scores.

Table 4. Model summaries of regressions predicting microstructure outcomes.

Variable	β	R^2	R^2 change
Spanish			
Step 1		.04	.04
Age	–.19		
Step 2		.12	.08*
Age	–.13		
English input	–.30		
Step 3		.16	.03
Age	–.13		
English input	–.08		
English output	–.28		
English			
Step 1		.00	.00
Age	–.06		
Step 2		.01	.00
Age	–.04		
English input	–.09		
Step 3		.01	.00
Age	–.04		
English input	–.13		
English output	.05		

*$p < .05$.

Aim 3: Predicting Narrative Comprehension and Production in Spanish and English

Our third research aim sought to explore how language experience relates to bilingual adolescents' narrative comprehension and production in Spanish and English (as tested on the TNL) while controlling for age. Spanish narrative comprehension results are shown in the top half of Table 5. At Block 1, age did not significantly account for any variability (adjusted $R^2 = .00$), $F(1, 63) = 0.95$, $p = .332$. At Block 2, English input did not account for any additional variability and was not significant (adjusted $\Delta R^2 = .01$), $F(1, 62) = 1.63$, $p = .206$. At Block 3, the addition of English output significantly improved variance explained, accounting for 10% (adjusted $\Delta R^2 = .06$) of bilinguals' Spanish narrative comprehension, after controlling for age and input, $F(1, 61) = 4.08$, $p < .05$. After three blocks, the resulting model was significant and accounted for approximately 10% of variability in adolescents' Spanish narrative comprehension scores, with English output being the only significant predictor. Thus, the lower proportion of time an adolescent spent using English in a typical week (i.e., the more time they spent using Spanish), the greater their narrative comprehension scores were in Spanish.

Next, we explored the contribution of age, English input, and English output on narrative comprehension in English. The bottom half of Table 5 features English narrative comprehension results. At Block 1, age was a

Table 5. Model summaries of regressions predicting macrostructure outcomes.

Variable	β	R^2	R^2 change
Spanish narrative comprehension			
Step 1		.01	.01
Age	.12		
Step 2		.04	.02
Age	.15		
English input	–.16		
Step 3		.10	.06*
Age	.16		
English input	.12		
English output	–.37		
English narrative comprehension			
Step 1		.09	.09*
Age	.30		
Step 2		.11	.02
Age	.27		
English input	.15		
Step 3		.12	.00
Age	.27		
English input	.06		
English output	.13		
Spanish narrative production			
Step 1		.00	.00
Age	–.09		
Step 2		.07	.06
Age	–.04		
English input	–.25		
Step 3		.20	.13**
Age	–.03		
English input	.17		
English output	–.56		
English narrative production			
Step 1		.00	.00
Age	.05		
Step 2		.01	.01
Age	.03		
English input	.11		
Step 3		.02	.01
Age	.03		
English input	.24		
English output	–.18		

*$p < .05$. **$p < .01$.

significant addition to the model and accounted for 9% (adjusted $\Delta R^2 = .08$) of the variation in adolescents' English narrative comprehension, $F(1, 63) = 6.42$, $p = .014$. At Block 2, English input did not significantly account for additional variance (adjusted $\Delta R^2 = .02$), $F(1, 62) = 1.56$, $p = .217$. At Block 3, English output did not significantly account for any additional variance (adjusted $\Delta R^2 = .01$), $F(1, 61) = 0.47$, $p = .496$. Overall, the resulting model with three independent variables was significant and accounted for approximately 12% of variability (adjusted $R^2 = .08$, $p = .047$) in children's English narrative comprehension, with only age retaining individual significance. Thus, the proportion of time an adolescent spent hearing English versus Spanish was not significantly related to their English narrative comprehension; only age was significantly related to English narrative comprehension.

We also examined the contribution of age and language experience on narrative production in Spanish and

English. Spanish narrative production results are shown in the top half of Table 5. At Block 1, age did not significantly account for any variance in Spanish production (adjusted $R^2 = -.01$), $F(1, 62) = 0.545$, $p = .463$. At Block 2, the addition of English input to the model accounted for 7% of additional variance (adjusted $\Delta R^2 = .04$), $F(1, 61) = 3.92$, but was not statistically significant, $p = .052$. At Block 3, the addition of English output significantly improved variability explained, accounting for an additional 20% of variance (adjusted $\Delta R^2 = .18$), $F(1, 60) = 9.92$, $p < .01$. After three blocks, the resulting model with three independent variables was significant and accounted for approximately 20% of variability in adolescents' Spanish narrative production scores (adjusted $R^2 = .16$), with English output being the only significant predictor. Thus, the less English an adolescent used in a typical week (i.e., the more Spanish they used), the greater their Spanish narrative production scores.

The bottom half of Table 5 features narrative production results in English. At Block 1, age did not significantly account for any variance (adjusted $R^2 = -.01$), $F(1, 63) = 0.19$, $p = .663$. At Block 2, English input did not significantly explain any additional variance (adjusted $\Delta R^2 = -.02$), $F(1, 62) = 0.666$, $p = .418$. At Block 3, the addition of English output did not significantly improve variance (adjusted $\Delta R^2 = -.02$), $F(1, 61) = 0.866$, $p = .350$. Thus, both age and experience were unrelated to bilingual adolescents' English narrative production scores.

Discussion

In the U.S. context, Latinx families may emphasize the use of Spanish at home and English in the greater community (Surrain, 2021). Previous cross-sectional (Kohnert, 2010) and longitudinal (Oppenheimer et al., 2020) studies have documented the shift from greater home language skills to greater English language skills. What this shift in language use means for bilingual adolescents' language skills remains unclear. To better understand how bilingual adolescents' language experience impacts their narrative language outcomes in Spanish and English, this study attempted to describe experiential sources of variation in bilingual adolescents' performance in Spanish and English. Specifically, our study comprised three aims: first, to describe bilingual adolescents' narrative skills in English and Spanish; second, to examine how language experience relates to bilingual adolescents' narrative microstructure; and third, to examine how language experience relates to bilingual adolescents' narrative comprehension and production. All outcomes were measured in both English and Spanish.

With respect to Aim 1, we found highly variable narrative scores across both English and Spanish. This is evidenced by the wide range of scores and large standard deviations. As a group, adolescents were similarly grammatical and productive across English and Spanish, as indicated by their microstructure scores. Note that, on average, adolescents did not produce utterances that were 100% grammatical in either language. This is consistent with reports of younger bilingual children (Bedore et al., 2010). However, note also that our participants demonstrated high individual variability in both languages as evidenced by the wide range of scores in Spanish (0%–100%) and English (48%–100%) grammaticality.

Exploring adolescents' narratives cross-linguistically revealed some slight but significant differences on macrostructure narrative tasks that appear to favor English. This pattern could indicate that the process of organizing and telling a coherent story with expected story elements was more demanding in Spanish than in English, even though participants were able to generate complete, productive sentences in both languages. The clustering of data at the top of Figures 2 and 3 also shows that most adolescents scored better in English than Spanish in narrative production and narrative comprehension as measured by the TNL. This is consistent with prior work on bilingualism that has reported a shift toward English language use as bilinguals enter school (Kohnert, 2010) and a crossover to English language proficiency during adolescence (Gamez et al., 2015; Tran, 2010).

We next explored the contribution of language experience on children's narrative scores, in both microstructure (Aim 2) and macrostructure (Aim 3). Our measurement of language experience was limited to parent reports of adolescents' hour-by-hour language input and output. Despite this limitation, our results yielded some preliminary findings that suggest a possible relationship between language experience and Spanish narrative skills. For Aim 2, we found that language input (i.e., the proportion of time bilinguals spend hearing English vs. Spanish) explained approximately 10%–12% of variability in Spanish microstructure scores. As parents report that their bilingual adolescents hear increasing amounts of English in their environment (and less Spanish), their microstructure scores in Spanish decrease slightly. Inversely, as parents report that their bilingual adolescents hear increasing amounts of Spanish in their environment (and less English), their microstructure scores in Spanish increase slightly. It is important to note that, while statistically significant, the amount of variance accounted for was relatively minor. However, when we examined a parallel relationship in English, we did not see a similar association between parents' report of language experience and their children's microstructure scores in English. When predicting English microstructure scores, neither age nor English experience (input or

output) was significantly related to adolescents' English narrative microstructure scores.

It is possible that this lack of a relationship was due to our gross, indirect measure of language experience. However, it may also be the case that experience is less important for English language performance as bilinguals get older. This aligns with prior work showing that experience is highly linked to performance in young bilinguals, but as children reach third grade, that experience predicts less and less of the variance in language performance (Bedore et al., 2012). Our results also support prior findings showing that Spanish language outcomes are more closely associated with current language experience than English outcomes, particularly in school-age bilinguals (Bedore et al., 2012, 2016). It is possible that this is influenced, in part, by the broader community and school contexts in the United States, in which children experience greater exposure to English over time. A similar pattern was observed when we explored the contribution of language experience on narrative macrostructure for Aim 3. English narrative comprehension and production were unrelated to the experiential variables collected from the participants' parents.

A final finding to emerge from Aim 3 was a differentiation between language input and language output. Language input—or the amount of time parents report their adolescent spends hearing English (vs. Spanish) during a typical week—was unrelated to Spanish macrostructure scores. Language output—or the amount of time parents report their adolescent spends speaking English (vs. Spanish) during a typical week—was significantly related to Spanish narrative comprehension and Spanish narrative production. Specifically, we found that the more time an adolescent spends speaking in Spanish, the higher their Spanish macrostructure scores across both comprehension and production. As with microstructure scores, the relationships were weak but significant. However, this finding may be suggestive of a larger trend toward input being less important for language performance than output, particularly as bilinguals get older. This may be easier to conceptualize with an example: One bilingual adolescent may hear Spanish in their environment 50% of the time and English in their environment 50% of the time, but they choose to respond only in English. Another bilingual adolescent may hear a similar percentage of English and Spanish in their environment but respond in Spanish when spoken to in Spanish (50% of the time). Our results would suggest that bilinguals who are more apt to use Spanish in their day-to-day communication are more likely to have greater Spanish narrative skills than a peer who receives similar input in Spanish but prefers to respond in English. However, these results should not be interpreted causally.

It is worth cautioning that, overall, our results yielded only modest associations between language experience and narrative language outcomes. Future research should explore additional factors to explain the heterogeneity in bilinguals' narrative language skills. Longitudinal work is needed to unpack the effects of attitudes toward bilingualism (Sicam & Lucas, 2016), opportunities for practice, and/or available communicative partners on their language skills over time. It may also be that language experience is less critical for older bilinguals because, once acquired, less time practicing the language may be required to accurately use it. We, cautiously, take this to suggest that English narrative skills emerge in U.S. educational contexts irrespective of how much non-English language an adolescent is exposed to or chooses to use. In our data set of 65, only one participant scored below 50% on either of the English narrative tasks.

Conclusions

Considered together, our results give us a glimpse into the microstructure and macrostructure narrative skills of bilingual adolescents as they relate to their language experience. Though our results yielded some significant findings, the proportion of variance we were able to explain using experiential variables was modest. Theoretically, our results lend support to the UCM (MacWhinney, 2001) of bilingual language acquisition, which suggests that language use is multidimensional and influenced by multiple contextual factors. In this study, we found that Spanish use was predictive of Spanish language outcomes. In UCM terms, this suggests that the continued internalization of Spanish requires intentional opportunities to hear and use Spanish. However, home language experience explained only a modest proportion of variance, suggesting that other factors posited in the UCM (e.g., language prestige, community perceptions, etc.) and other experiential opportunities (e.g., school and peer-related exposure) may be worth exploring, particularly among adolescents who may be acutely aware of social pressures to "fit in" with their peers (Laursen & Veenstra, 2021).

Clinical Implications

This study explores the relationship between language experience and narrative language skills, and its results pose clinical implications for educators and speech-language pathologists working with Latinx bilingual adolescents. Our findings suggest some value in adolescents' hearing and using Spanish, particularly when maintenance of the heritage language is a goal. The need for opportunities to hear and use Spanish is further compounded for Latinx adolescents with language and communication

disorders, as they will likely need more exposure to Spanish than a typical language learner to acquire and maintain L1 skills (Smolander et al., 2021). Future research should systematically explore how experience contributes to language skills among adolescents with communication disorders. Critically, parents of bilinguals with language and communication disorders are often, mistakenly, told to prioritize English learning (Gutierrez-Clellen, 1999). This misinformation can further isolate bilingual adolescents from their linguistic communities and limit language-learning opportunities that arise from being exposed to their heritage language. Notably, we found that hearing and using more Spanish (and less English) had no relationship to our participants' English narrative outcomes. Thus, our results suggest that bilingual Latinx adolescents can be given opportunities to hear and use their heritage language without fear of compromising their English language skills.

Limitations

Our findings should be interpreted in light of several limitations. First, only parent reports were used to operationalize English versus Spanish exposure and use. We did not interview teachers about adolescents' language experiences in schools, nor did we collect data about adolescents' cumulative language experience at school. Including both parent and teacher report would have provided a more nuanced rating of language experience. Relatedly, it is possible that language experience would be better represented by collecting data from multiple sources, including from adolescents themselves. This is especially important in research related to adolescents because as adolescents enter this developmental stage, they are in the process of gaining autonomy. It should be noted that the participants in this study were primarily early adolescents, which supports the validity of the parent report in this case (Peña et al., 2020). Second, the narrative measures utilized in this study were designed for somewhat younger children. It is widely understood that narrative tasks do not tax the adolescent language system in the ways that narrative critical thinking activities would (i.e., discussion of character conflict resolution and discussion of morals/values embedded within narratives; Nippold et al., 2008; Nippold, Vigeland, & Frantz-Kaspar, 2017; Nippold, Vigeland, Frantz-Kaspar, & Ward-Lonergan, 2017). Although ceiling effects were not observed in the narrative measures used in this study, the types of tasks recommended for adolescent language assessment were not used. It is possible that these alternate types of narrative related tasks would have elicited more complex language productions in each language and thus provided a more nuanced view of narrative language outcomes as they relate to language exposure. Finally, we did not include measures of language attitudes and perception, which is of possible contextual importance to this demographic. Future research should explore language experience from the perspective of adolescent self-reporting, considering influences of language attitudes on linguistic outcomes for bilingual adolescents.

Data Availability Statement

The de-identified data analyzed in this study are available upon reasonable request via Erin M. Rodriguez through the Department of Educational Psychology, The University of Texas at Austin.

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