

Dual-Language Immersion and Age Effects in Subjunctive Mood Development in Child Heritage Spanish

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Dual-Language Education and Age Effects in Subjunctive Mood Development in Child Heritage

Spanish

AUTHOR BLINDED

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Abstract:

A widespread assumption in the research literature is that children who receive a dual-language education (DLE) develop competence in their heritage language that would not be possible through monolingual schooling. The present study investigated this claim through a comparison of the acquisition of the subjunctive mood in 75 English-dominant Spanish heritage speakers of Spanish in fifth, seventh, and eighth grades, some of whom were enrolled in a DLE program. Results were compared with a group of 18 Spanish-dominant bilingual adults. Participants completed production and forced choice tasks, which revealed considerable substitution of indicative or infinitival forms. There were no differences in mood production or selection between children in the monolingual and bilingual schools. However, older children in the seventh and eighth grades showed higher rates of subjunctive production and selection, suggesting that mastery of this structure improves with age. Implications for heritage language acquisition theory and for DLE are discussed.

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1. Introduction

A central question in children’s bilingual development is how patterns of exposure characterize the acquisition process of the minoritized or heritage language (HL). HLs are varieties spoken in situations of language contact where speakers frequently develop stronger competence in another, more socially-prevalent language. HLs frequently develop in the home without support through education. In the United States, the exception to this trend comes in the form of dual-language education (DLE), in which children receive schooling in two languages. Research on DLE has revealed a multitude of benefits for heritage speakers (HS) of Spanish, the largest HL in the United States, including superior academic performance (e.g., Marian et al., 2013; Thomas & Collier, 2002), cultural sensitivity (Bearse & de Jong, 2009), and executive functioning (Garraffa et al., 2020; Nicolay & Poncelet, 2015). Research has also shown that Spanish HS children experience growth in their English language proficiency and comprehension when enrolled in DLE despite less exposure than peers in traditional schools (Christian et al, 2004; Marian et al., 2013).

Ironically, the development of HS’ Spanish language skills in DLE has not yet been studied in a way that compares these bilinguals to children of similar characteristics in a traditional monolingual school. This reveals an assumption that DLE guarantees superior command of grammar in the HL compared to monolingual schooling that has simultaneous implications for our understanding of childhood HL development and bilingual education policy. However, although multiple studies have evaluated language development in immersion programs, only one has compared HL acquisition through a comparison of a DLE and traditional monolingual education.

The assumption that DLE facilitates development of the HL finds a natural explanation in Putnam and Sánchez’s (2013) approach to HL acquisition and maintenance. These researchers postulate that patterns of use and exposure continuously shape HS’ grammatical systems.

Following their proposal, frequent activation of the HL is necessary to convert input to intake, which strengthens the relationships between functional features and their realizations on individual lexical items. Therefore, HS who process their HL more frequently show knowledge of morphology and syntax that patterns more closely with other groups of speakers of the same language, while disuse of the HL leads to a gradual reassembly of features by the more-dominant L2. This approach prioritizes the separation of lexical knowledge from underlying syntactic competence, such that variability is lexically-driven, emerges in production, and may or may not affect representation until later stages of reassembly. Consequently, this approach calls for the assessment of productive and receptive knowledge separately, because HS may reassemble features asymmetrically across these two domains (Perez-Cortes et al., 2019). Evidence of asymmetrical knowledge of morphosyntactic structures in the HL has been documented in research with adult HS (Giancaspro & Sánchez, 2021; Perez-Cortes, 2016; Sherkina-Lieber, 2015), but it has not yet been the topic of research with older bilingual children.

The present study is well-positioned to explore how DLE impacts language development in older children, and the ways in which exposure to Spanish has a long-term impact on HS' grammatical knowledge. In so doing, this paper evaluates HS' production and selection of subjunctive mood in English-Spanish bilingual children, as this structure has been shown to be acquired distinctly by HS populations when compared to other groups of bilinguals. Therefore, a logical starting point for this article is to review the previous research on the role of bilingual education in language development, before presenting the subjunctive mood and the relevant previous studies on its acquisition.

2. Linking Exposure and Dual-Language Education

There has been a small but impactful number of studies that have indirectly evaluated the role of formal instruction in the HL. These studies, as cited by Kupisch and Rothman (2018), compare speakers of different HLs living in Germany with differences in access to bilingual education. On one hand, a set of studies showed that adolescent French HS living in Hamburg, Germany and attending a French high school patterned similarly to a mirror group of German HS living in France in their knowledge of multiple phonological and morphosyntactic structures. However, in comparison studies evaluating the same phenomena, Italian HS living in Germany who did not receive education in their HL showed greater variability than the French HS when compared to Italian-dominant German HS. Together, these studies argue that education in the HL has important implications for its development.

Neither set of studies carried out by Kupisch and colleagues evaluates language development in speakers of the same languages in two educational contexts, but one such study has been carried out concerning Spanish. Gathercole (2002) evaluated the impact of type of education on the acquisition of non-canonical gender with 311 Spanish HS and second language (L2) learners in second and fifth grades. Some participants were enrolled in a DLE program, and others received monolingual schooling. On a grammaticality judgment task concerning non-canonical gender morphology (e.g., nouns that end in the traditional feminine inflection *a* but are masculine), fifth grade HS students in DLE were more accurate than second graders in the same program, but the opposite was true of HS in the monolingual program. Therefore, this study simultaneously exposes the likelihood of attrition in the absence of bilingual education and the positive impact of DLE and the resultant exposure to the HL on HS' acquisition of Spanish in the childhood years. Together, Kupisch and colleagues' and Gathercole's studies signal that patterns of language exposure affect the acquisition of the HL across childhood, which aligns with Putnam

and Sánchez's (2013) approach. However, it is unclear if this advantage persists after the immersion years, or if a drop in exposure after the DLE years results in a reassembly of the subjunctive mood feature.

As mentioned previously, all other previous research on the impact of DLE on Spanish HS children, including with older children who are closer in age to adult HS, has not compared acquisition of Spanish in different educational contexts. For instance, while Montrul and Potowski (2007) found that HS in a DLE program improved their knowledge of grammatical gender with age, they reported considerable variability in the production of feminine gender in simultaneous bilingual children. Furthermore, in a series of studies, Potowski (2005, 2007a, 2007b) found differences between Spanish-dominant bilingual children and HS students in the seventh and eighth grades in DLE in their production of infinitival complements and aspect, mood, and conditional morphology. Finally, Fernández-Dobao and Herschensohn (2020, 2021) also found differences between fourth-grade HS in DLE and a group of Spanish-dominant children in their knowledge of irregular verbal morphology.

Together, these studies differ from those reported by Kupisch and Rothman (2018) because they do not find that bilingual education results in levels of competence comparable to speakers dominant in the same language. The percentage of Spanish instruction provided in the schools in each of these studies varied, which may have had an impact on results. Regardless, even in DLE programs, Spanish HS children experience variable use of morphological and syntactic structures; what is not evident is whether their command of these grammatical structures is superior to that of children without education in the HL. Therefore, the question of how educational circumstances impact HL exposure and the development of HL proficiency is retained are fruitful questions for

ongoing research. A fruitful area of the Spanish inflectional system with which to test these claims is the subjunctive mood, as argued in §3.

3. Spanish Subjunctive Mood

If patterns of exposure are deterministic in the acquisition of HLs, a logical hypothesis is that structures that also require extensive exposure in monolingual populations will be particularly susceptible to input effects. The subjunctive, which is one such structure, is one of three moods in Spanish alongside the indicative and imperative (Seco, 1990). Mood is a morphological realization of modality (Bosque, 2012), which is the evaluation of the truth value of propositions (Sánchez-Naranjo, 2014). In an analysis of over 2,000,000,000 words, Biber et al. (2006) found that only 7.2% of verbs were inflected for subjunctive, which points to its infrequency in the input that HS receive, especially if this exposure is less in quantity compared to monolingual acquisition.

There are two morphological paradigms for the subjunctive mood, one in the present tense, and the other in the imperfective past, both of which have forms for person and number agreement with the subject. In concert with most previous research, this study concerns the present subjunctive, so discussion is limited to this tense here. There are two ways in which the present tense of subjunctive mood is formed, either through a shift in the verbal inflection or through both a morphophonological change in the verb stem *and* a shift in inflection from the indicative. In this study, only the first of these patterns is considered to hold morphological regularity constant.

The syntax and semantics of subjunctive mood has been the topic of considerable scholarship that is beyond the focus of this paper (see Kempchinsky, 2009). Unlike many instances of the Spanish inflectional system in which one morphological paradigm has a single meaning, the subjunctive maps onto multiple syntactic contexts. It occurs almost exclusively in subordinate clauses whose subject differs from the main clause, which is known as the *disjoint reference effect*.

Some uses of the subjunctive result from lexical selection, whereby the lexical semantics of a constituent in the main clause selects the subjunctive mood in tensed subordinate clauses with a distinct subject. Volitional clauses, such as with the verb *querer* (*to want*), are the focus of the present study and exemplify this context of subjunctive mood, which is the structure analyzed in this study. However, other instances of the subjunctive occur in contexts in which the indicative is also grammatical, which means that mood selection is pragmatically dependent. These contexts include adjectival relative clauses and adverbial clauses, which are not analyzed here.

3.1. Acquisition of Subjunctive Mood by Monolingual Children

The first subjunctive inflections emerge in monolingual Spanish-speaking children by age two (Montrul, 2004). Dracos et al. (2019) found that the youngest monolingual children in their study produced the subjunctive in volitional clauses following the matrix verb *querer* in over 90% of sentences by between ages four and five, around the onset of schooling. However, other studies have shown that other uses of the subjunctive mood are contingent upon the development of Theory of Mind. For instance, because the subjunctive and indicative are both grammatical in relative clauses but have subtly different interpretations, children must first recognize false beliefs on a Theory of Mind test before reliably distinguishing between moods, which transpires as late as 6;11 (Ahern & Torrens, 2021; Pérez-Leroux, 1998). Dracos et al. (2019) found that monolingual children continue to master the subjunctive with nonassertive predicates through age ten, showing that even in input-rich situations, subjunctive mood morphology follows a protracted acquisitional path in children.

3.2. The Role of Exposure in Subjunctive Acquisition in Bilingual Children

There are four studies on the subjunctive mood in bilingual children, all of which validate the importance of exposure in its development. In the first, Silva-Corvalán (2014) documented her

two grandsons’ development of the Spanish verbal system longitudinally. Her two grandsons, Nico and Brennan, were born in the United States, spoke English at home with their mother, and generally spoke Spanish with their father and with her. Nico, the researcher’s older grandson, received approximately one third of his input before the school period in Spanish, and developed a qualitatively similar mood system to that of a Spanish-dominant bilingual child and a monolingual child. Nico’s first use of the subjunctive emerged at 2;6 and continued to develop, albeit with occasional substitutions of the indicative, until the conclusion of the study, when he was 6;0. In contrast, Silva-Corvalán’s second grandson, Brennan, had cumulatively less exposure to Spanish. Interestingly, Brennan produced his first subjunctive utterance at 2;5, one month earlier than his brother, but the substitution of indicative and infinitival forms became increasingly common. By age five, there was not a single instance of subjunctive mood morphology in Brennan’s production, concurrent with a decrease in his exposure to Spanish.

In the second study, Anderson (2001) evaluated the morphological development of two sisters, Beatriz and Victoria, longitudinally. Their parents were bilingual and used Spanish at home. Unlike in the case of Silva-Corvalán’s grandchildren, Victoria, the younger sibling, experienced greater grammatical growth over the experimental sessions because she interacted with a Spanish-speaking preschool teacher. Across a two-year period, her mood error rate was 36.2%, while Beatriz’s was 44.7%. Intriguingly, Victoria’s mood errors decreased across sessions, while they remained persistent in Beatriz’s production. Both longitudinal analyses thus point to the impact of exposure on the acquisition of the subjunctive mood.

To date, the only cross-sectional study on the acquisition of subjunctive in child HS of Spanish is Dracos and Requena (2022). In this study, the researchers explored Spanish HS’ production of subjunctive mood in volitional and adverbial clauses with 50 children between four

and fifteen years of age. Results from a sentence completion task revealed that overall proficiency and, to a lesser degree, home language use and exposure shaped HS' knowledge of mood in volitional and adverbial contexts. There was an advantage for production of earlier-acquired volitional clauses over adverbial clauses, but no effect for age at the time of testing. However, Dracos and Requena (2022, p. 22) note that their study had a limited sample of older HS children, which they acknowledge may have affected their results: "With a larger sample size of older child HSs (our study only included $n = 10$ children aged 10 or older), we might find...a developmental trend during these later school-aged years."

Lastly, Flores et al. (2017) reported different results concerning the acquisition of subjunctive mood subjunctive by 50 European Portuguese HS in Germany between six and sixteen years of age who completed a production task. The researchers found that children who spoke Portuguese with both of their parents and who did not have older siblings dominant in German at home showed considerable growth in producing subjunctive mood between ages eight and twelve, while children in bilingual households with one Portuguese-speaking parent showed comparable growth after age thirteen. Unlike Dracos and Requena (2022), subjunctive knowledge increased with age, but the growth rate across years was modulated by patterns of HL exposure. The HS with one Portuguese-speaking parent and older siblings converged on similar rates of subjunctive mood as those who exclusively used Portuguese with their families, despite taking longer to reach this stage. Both groups eventually produced the subjunctive in approximately 80% of expected contexts. Importantly, the HS in Flores et al.'s (2017) study continued to develop subjunctive mood well beyond the start of the school period, inviting the possibility that DLE could provide a crucial source of exposure to Spanish HS during these developmental years. In fact, all participants attended an afterschool Portuguese language program, providing them with a degree of instruction

in and exposure to the HL. This is particularly relevant following López-Beltrán Forcada (2021), who found that the size of adult HS’ Spanish-speaking social networks affected their rates of subjunctive mood production in Spanish.

3.3. Adult HS Research on Subjunctive Mood

In addition, studies concerning HS adults’ knowledge of the subjunctive have also shown that patterns of exposure affect its acquisition. Multiple previous studies have shown that frequency of use of Spanish affects HS’ knowledge of subjunctive mood, particularly in production (López-Beltrán Forcada, 2021; Perez-Cortes, 2016). Participants’ proficiency level (i.e., Giancaspro et al., 2022; Montrul, 2009; Montrul & Perpiñán, 2011; Perez-Cortes, 2016) and age of acquisition of English (Giancaspro, 2019) have both accounted for rates of subjunctive mood production and interpretation; both metrics are proxies to cumulative exposure to the HL during childhood (Giancaspro & Sánchez, 2021; Montrul, 2016).

Furthermore, although many studies have found that the subjunctive mood is a structure with which HS show a wide gamut of variability ranging from indistinguishable competence from speakers dominant in the same language to a total disuse of this structure, there are patterns across adult HS’ mood systems. Some researchers have found that irregular verbs favor the production and interpretation of subjunctive morphology (Giancaspro et al., 2022; López-Beltrán Forcada, 2021; Perez-Cortes, 2022). Furthermore, Giancaspro (2020) found that HS are sensitive to the frequency of individual lexical items onto which subjunctive inflections are assembled. Finally, multiple studies (Giancaspro, 2019; Montrul, 2009) have shown that HS generally are most attuned to the subjunctive in volitional clauses than its use in other syntactic contexts, such as adverbial and relative clauses. This is consistent with the order of monolingual acquisition (Dracos et al.,

2019; Pérez-Leroux, 1998), which further reinforces the claim that exposure conditions the development of this structure.

4. The Study

Between the findings that age of acquisition and proficiency, both of which are proxies to cumulative HL exposure, as well as direct estimations of cumulative HL exposure, have accounted for differences in the acquisition of mood in bilingual adults and children, it can tentatively be claimed that formal education that boosts the use of the HL would facilitate children's development of this structure. In fact, in their study with bilingual adults, Montrul and Perpiñán (2011) found that proficiency-matched intermediate and advanced second language (L2) learners outperformed HS in their production and judgment of mood contrasts, likely owing to metalinguistic experience with and formal instruction in Spanish. To reduce the confound between the role of input effects and general protracted development of mood common to all Spanish-speaking children, the syntactic context of subjunctive mood selected for this study was the earliest-acquired in previous studies, specifically volitional clauses with the frequent matrix verb *querer*.

Such findings would provide evidence in favor of the role of exposure in HL development, as supported by Putnam and Sánchez (2013), and would systematically explore the linguistic benefits of DLE relative to other methods of schooling. Furthermore, by testing multiple age groups, it is possible to estimate changes in linguistic knowledge over time: as Montrul (2013) points out, in the absence of longitudinal data, cross-sectional studies with different age groups of otherwise similar participants adopt a "quasi-longitudinal" approach. Through this type of analysis, it is possible to determine if HS' mood knowledge is restructured over time, as predicted by Putnam and Sánchez (2013), or if there is a protracted developmental process that is modulated

by exposure and age without signs of attrition, as in Flores et al. (2017). To address these questions, the following research questions and predictions were proposed:

1. Does DLE influence Spanish HS’ production and receptive knowledge of subjunctive mood in volitional clauses?

In alignment with the available data on the role of educational context on language development, it was hypothesized that HS in fifth grade at the end of a DLE program would produce more instances of subjunctive mood and would select it more frequently on a receptive task than HS in a traditional school. Therefore, an effect of participant group was predicted, whereby fifth graders in DLE would have a higher percentage of subjunctive production and its selection than age-matched children in a monolingual school.

2. Is the effect of DLE durative on Spanish HS’ knowledge of subjunctive mood in volitional clauses?

On one hand, Putnam and Sánchez (2013) predict restructuring of the HL after a drop in exposure, regardless of the participant’s age. Following their model, older HS who have graduated from DLE predictably would a reassembly of the subjunctive mood system when compared to peers actively enrolled in the same program. On the other, Flores et al. (2017) reported that Portuguese HS showed growth in subjunctive mood production across the childhood and adolescent years, but children with less cumulative exposure grew at a slower rate. These findings appear to be in conflict with one another, which challenges the ability to make a clear hypothesis for this question. If children who graduated from an immersion program show a decline in subjunctive mood production and selection on a receptive task, this would support Putnam and Sánchez’s (2013) activation approach of HL restructuring. However, if HS do not show a decline, as was the instance in Flores et al.’s (2017) data, then one of two interpretations are possible: either that the effect of

DLE is sustained after the program, or that children improve with age regardless of their past experiences with their HL.

3. Does HS' knowledge of subjunctive mood in volitional clauses grow with age?

While DLE confers HS extensive exposure to the HL during the primary years, but lose this source of input in Spanish as they approach adolescence, the experiences that HS in monolingual schools have with Spanish predictably remain more constant. Therefore, the likely hypothesis is that HS in immersion programs will show a steady rate of mood production and selection between fifth grade during an immersion program and seventh and eighth grades after the immersion program, as the effects of older age and decreased exposure may cancel one another out, while children in the seventh eighth grades in a monolingual school would show more subjunctive production and selection than their younger peers. This would align with the findings of Flores et al. (2017), as all children in their study improved with age, but at different rates dictated by patterns of exposure.

4. Do older HS children show asymmetrical knowledge of the subjunctive in production and selection?

Previous research on the subjunctive mood in bilingual children has not yet tapped their receptive knowledge of it. However, Perez-Cortes (2016) found that adult HS of Spanish who reported infrequent activation of the HL interpreted the subjunctive and rated it as acceptable more than they produced it. Therefore, based upon the available data, a logical interpretation is that except for HS in fifth grade with exposure to Spanish through DLE, HS would select the subjunctive more frequently than they produce this structure.

4.1. Participants

To investigate these questions, five participant groups took part in this study. Two age groups of DLE students who are Spanish HS, alongside two matched groups of monolingually-educated HS peers, were considered, and a group of Spanish-dominant bilingual adults, participated in the experiment. The DLE program was situated in a K-8 charter school, where students received 50% of their curriculum in Spanish from Kindergarten through fifth grade, and then receive Spanish as a world language instruction in middle school. There were two groups of HS in the fifth grade (ages 10-11): the DLE students (herein, DLE-5) and age-matched peers in a monolingual school (herein, MLS-5). Many DLE programs terminate in the fifth grade, so the DLE-5 group purportedly represents the “end product” of this method of schooling. Furthermore, there were two groups of seventh and eighth graders, one who had been enrolled in the DLE program through fifth grade (herein, DLE-7/8), and one that had received a traditional monolingual education (herein, MLS-7/8). All students had two Spanish-speaking parents and attended schools with highly-similar demographic characteristics: there was the same percentage of English language learners enrolled at each school, and the schools served student bodies comprised primarily of Mexican-American HS.¹

There were 27 fifth grade students in the experiment from the DLE school, and twenty children in seventh and eighth grades from the DLE-7/8 group. However, seven fifth grade students and ten seventh and eighth grade students had begun the program in third grade or later, more than halfway through the immersion program.² As a result, these students had considerably

¹ Although the DLE program was branded as a two-way immersion school, there were fewer than ten students across the three grades studied who were not native speakers of Spanish.

² Only those students who had received the majority of their elementary education in the DLE program would be appropriately representative of the impact of it.

less exposure to Spanish at school than the remaining nineteen who had been in the program since kindergarten, so they were placed into the MLS-5 and MLS-7/8 groups, respectively. Therefore, in the final participant count, there were 19 students in the DLE-5 group, 22 students in the MLS-5 group, eleven students in the DLE-7/8 group, and 24 students in the MLS-7/8 group.

A comparison group of 18 SDB adults (average age: 33.6, SD = 10.19) participated in the study. These speakers were raised monolingually in a Spanish-speaking country and were living and working in the United States at the time of the study. The SDB retained high levels of proficiency in Spanish as measured using the adapted *Diploma del español como lengua extranjera* exam from Montrul & Slabakova (2003) (average score: 47.7/50, SD = 1.68). All SDB lived in a Spanish-speaking country until they were at least twelve years old, which research on language attrition has suggested to be the “threshold” in being resistant to extensive L1 attrition or restructuring (see Ahn et al., 2017 and references within). Participants were from a total of 7 Spanish-speaking countries or territories, and represented the input that second-generation HS receive. Following Pascual y Cabo and Rothman (2012), the inclusion of a bilingual comparison group disentangles the effects of language contact from those that are internal to HL change.

All participants completed a brief questionnaire concerning frequency of use of Spanish outside of school, number of English and Spanish-speaking parents, and years in the immersion program. To determine use of Spanish, participants reported how frequently they used their HL in five situations (with parents, with other family members, with friends, in public, while watching television) along 1-5 Likert scales, creating a 25-point continuum. The number of monolingual Spanish-speaking parents was also calculated for each participant group. In addition, all participants completed a fourteen-question subset of the Bilingual English-Spanish Assessment

(BESA; Peña et al., 2014) to measure morphosyntactic proficiency in Spanish. Table 1 reports the group-level averages of each of these metrics.

Variable	SDB (<i>n</i> = 18)		DLE-7/8 (<i>n</i> = 11)		MLS-7/8 (<i>n</i> = 24)		DLE-5 (<i>n</i> = 19)		MLS-5 (<i>n</i> = 22)	
	μ	SD	μ	SD	μ	SD	μ	SD	μ	SD
Frequency of use of Spanish	15.2	6.2	15.6	4.6	13.3	4.1	15.8	6.2	14.5	4.4
Proficiency	12.3	1.5	11.9	2.3	11.3	2.3	9.4	3.3	9.0	2.2
Number of monolingual Spanish-speaking parents	1.9	0.2	0.9	0.8	1.3	0.8	0.9	0.8	0.9	0.9

Table 1. Background characteristics by participant group.

To verify that participants in the immersion program and the traditional monolingual school were comparable in their proficiency, current use of Spanish outside of the classroom, and parental language use, three two one-sided tests (TOST) were necessary. The equivalence bounds were set at | 0.5 |, and type of schooling (DLE versus monolingual) was the grouping factor. In the final TOST, school (DLE charter school versus monolingual school) was the grouping factor in data analyzing the MLS-5 and MLS-7/8 group.

The first TOST evaluated the similarity between the Bilingual English-Spanish Assessment (Peña et al., 2014) scores of the participants in the DLE and monolingual school groups. There were no differences between the two groups’ BESA scores at a level that was significant at the $p < .05$ level, as shown in Table 2 and visualized in Figure 1. The second TOST compared the frequency of use of Spanish outside of school between participants in the two sets of groups. Frequency of use was the sum of the five 1-5 Likert scales on the background questionnaire (maximum 25). The results of this test are summarized in Table DD and Figure BB. There were no differences between groups with regards to frequency of use of the HL outside of school that were significant at the $p < .05$ level.

The final TOST compared the patterns of patterns of home HL exposure as measured through each participants’ number of monolingual Spanish-speaking parents. Participants with two

bilingual parents received a score of 0, those with one monolingual Spanish-speaking parent received a score of 1, and those with two monolingual parents received a score of 2. As illustrated in Table 4 and shown in Figure 3, there were no differences between groups significant at the $p < .05$ level. Therefore, proficiency, current frequency of use of Spanish, and parental language background were comparable between the students in the DLI school and those in the traditional monolingual school, minimizing the impact of these potentially confounding factors on the results of this experiment.

Table 2. Results of TOST for HS participants' BESA proficiency scores.

Metric	<i>t</i>	DF	<i>p</i>
t-test	0.0080	64.68	.9935
TOST Upper	2.1095	64.68	.0193
TOST Lower	-2.0934	64.68	.0201

Table 3. Results of TOST for HS participants' frequency of HL use.

Metric	<i>t</i>	DF	<i>p</i>
t-test	0.0686	64.39	.9454
TOST Upper	2.1762	64.39	.0166
TOST Lower	-2.0389	64.39	.0227

Table 4. Results of TOST for HS participants' patterns of language exposure.

Metric	<i>t</i>	DF	<i>p</i>
t-test	-0.1448	64.77	.8852
TOST Upper	1.9546	64.77	.0274
TOST Lower	-2.2444	64.77	.0141

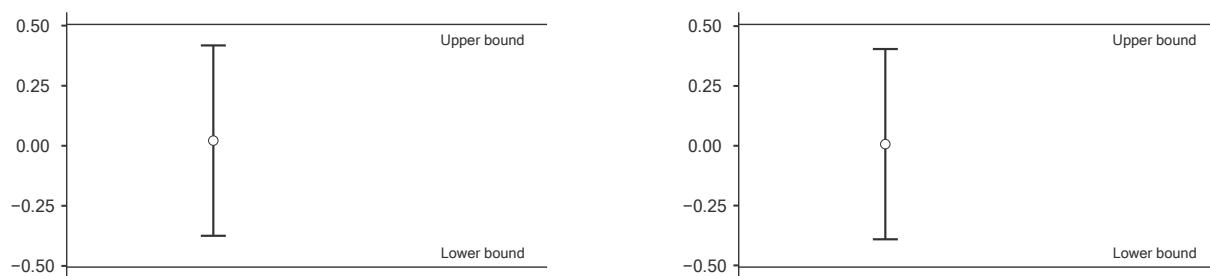


Figure 1 (left). Results of TOST for differences between HS participant groups' frequency of use of Spanish.

Figure 2 (right). Results of TOST for differences between HS participant groups' morphosyntactic proficiency.

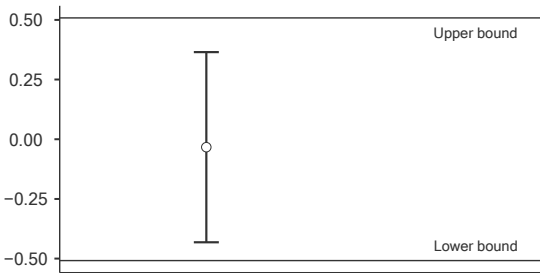


Figure 3. Results of TOST for differences between HS participant groups’ patterns of exposure to Spanish.

4.2. Experimental Tasks

In addition to the questionnaire and proficiency test, there were two experimental tasks in the study: a sixteen-item elicited production task and a 23-item forced choice task. These two tasks were centered around a communicative context in which a mother shares how she wants her twin daughters to care for their younger brother, Juanito, while they are away at sleepaway camp. Both tasks were administered using laptop computers over Qualtrics software in students’ schools (the SDB carried out the study online). As in many previous studies, the prompts were displayed on a screen, but their responses were oral. A computerized software known as Phonic was embedded into the Qualtrics survey to record participants’ responses on the production task. Prior to the study, participants and their parents signed a consent form (IRB protocol #2021001902).

Concerted effort was taken to ensure that there were no confounding factors in the selection of subordinate verbs onto which subjunctive inflections are assembled that could have influenced speakers’ mood production and selection tendencies. To avoid effects of conjugation class or morphological regularity, all verbs pertained to the most-frequent first conjugation (–ar), were matched for syllable length (disyllabic), and were transitive. The same eight verbs were used once in each task for consistency.

The first task, the Elicited Production Task (EPT), targeted the production of subjunctive mood. The task contained sixteen items, as well as a trial item before the first sentence. There was

a brief written prompt before each sentence in the third person about the mother's desires for her children while they are at the summer camp. The instructions informed participants that they needed to complete the final sentence using any form of the word in parentheses, as well as any other necessary words. Participants could not change or move any of the words in the prompt.

There were eight sentences targeting the subjunctive mood in volitional clauses with the frequent matrix verb *querer*, as in (1) below. This verb lexically selects this mood in subordinate clauses in contexts of disjoint reference.³

- (1) A veces Juanito se pone triste si sus hermanas dicen que no quieren hablar con él. ¿Qué quiere la mamá? *Quiere que las hermanas* _____ (LLAMAR) Juanito cada noche.
Sometimes Juanito gets sad if his sisters say that they don't want to talk with him. What does the mother want? She wants the sisters _____ (CALL) Juanito every night.

In addition, the experiment contained eight additional distractors not reported here, including four targeting the indicative mood, which reduced the likelihood that participants recognized patterns of subjunctive mood use. In the adult version, there were also 31 additional distractors targeting other areas of the Spanish mood system and other morphosyntactic properties that were inserted between the target items.

In the Forced Choice Task (FCT), participants again read prompts related to the mother's desires for her children while they are away at sleepaway camp. There was a total of 23 items in the task. Eight items targeted the subjunctive in volitional clauses following *querer*, as in (2), and fifteen were distractors, including three targeting indicative mood. The adults' experiment contained an additional 31 items targeting other morphosyntactic properties that, like the EPT, were inserted between the target items.

³ Note that in all of these sentences, the differential object marker *a* was missing, as this experiment also tested HS' knowledge of DOM in each of these sentences that is analyzed in a separate experiment.

- (2) La mamá sabe que las hermanas no siempre hablan con Juanito. ¿Qué quiere la mamá?
- a. *Quiere que las hermanas lo **miran** cuando hablan con él.
 - b. Quiere que las hermanas lo **miren** cuando hablan con él.

The mother knows that the sisters don't always talk with Juanito. What does she want?

- a. *She wants the sisters to look at (*IND) him when they talk with him.*
- b. *She wants the sisters to look at (SUBJ) him when they talk to him.*

In this exercise, participants needed to select which one of two answers that described each prompt that they felt sounded best. The two sentences were minimal pairs that differed only in the use of either the subjunctive or indicative. Therefore, this task tapped participants' underlying knowledge of mood, as it required that they discern between the indicative and subjunctive without having to produce in the HL. Since the FCT was administered in written format, the subordinate verbs were boldfaced in both sentences to emphasize the difference between them.

5. Results

All data were anonymized and uploaded to a public GitHub repository (URL BLINDED FOR ANONYMITY). All data analysis took place in RStudio (R Core Team, 2022). Production or selection of mood formed the binary dependent variable for the present analysis, whereby responses in the present subjunctive received a score of 1, and all others received a score of 0. Note that forms with correct mood inflections but with verbal agreement morphology that did not match the subject were accepted as correct. Given there were a total of eight items in both tasks (EPT and FCT) and 93 participants completed the experiment, there were a total of 1,488 datapoints for analysis. Of the 1,488 observations, 39 responses in the EPT, all in the HS children's data, could not be interpreted due to audio quality issues, leaving all 744 observations in the FCT and 561 observations in the EPT (93.5%) available for analysis. The SDB participants produced subjunctive mood following the verb *querer* categorically; in contrast, of the 561 observations

remaining in HS' data, participants produced the subjunctive in 263 sentences (46.8%) and alternative forms in 298 sentences (53.1%). A list of innovative forms that HS produced is summarized in Table 5 below.

Table 5. HS' innovative responses to prompts eliciting subjunctive morphology.

Alternative	No. of responses	Percentage
Indicative present simple	235	78.7%
Infinitives	41	13.7%
Periphrastic future with <i>ir a</i> + infinitive	13	4.3%
Miscellaneous forms that could not be identified	5	1.6%
Imperfect subjunctive	3	1.0%
Preterit indicative	1	0.3%

5.1. Descriptive Statistics

As shown in Table 6 and Figure 4, HS were highly variable in their production and, despite greater consistency, with selection of subjunctive mood. This aligns with the high degree of substitution of indicative mood forms in the production task, such that as a whole, the HS in this study produced and selected the subjunctive in less than half of the expected contexts. In contrast, the SDB group showed robust knowledge and retention of this structure, both in production and at the receptive level.

Table 6. Percentage of mood production and selection by group, task, and structure (indicative distractors included).

Group	Subjunctive with <i>querer</i>		Indicative with <i>creer</i>	
	EPT	FCT	EPT	FCT
SDB	100%	97.9%	100%	99.0%
DLI-7/8	55.2%	77.5%	54.5%	56.6%
MLS-7/8	60.5%	76.0%	63.6%	66.6%
DLI-5	36.4%	56.2%	90.1%	53.7%
MLS-5	37.2%	55.9%	79.6%	67.0%

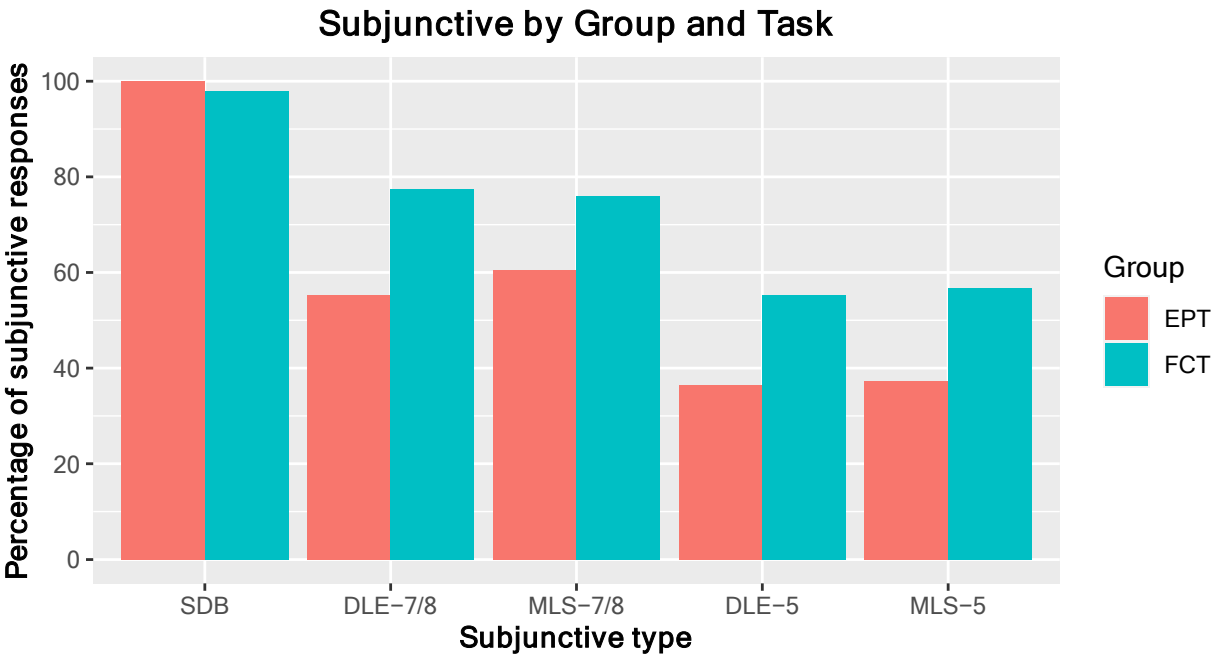


Figure 4. Percentages of subjunctive mood production and selection by group and task.

5.2. Inferential Statistics

To determine the effects of group and task, a linear mixed effects model was necessary. The model contained mood use as the binary dependent variable, and group, task, and their interaction as predictors. The SDB and EPT were established as the baselines for group and task, respectively. Participant and item were included as random effects. To verify the goodness of fit, pairwise nested model comparisons were carried out. The results of the pairwise comparisons revealed that the models including group, task, and their interaction were all significant at the $p < .05$ level, as reflected in Table 7.

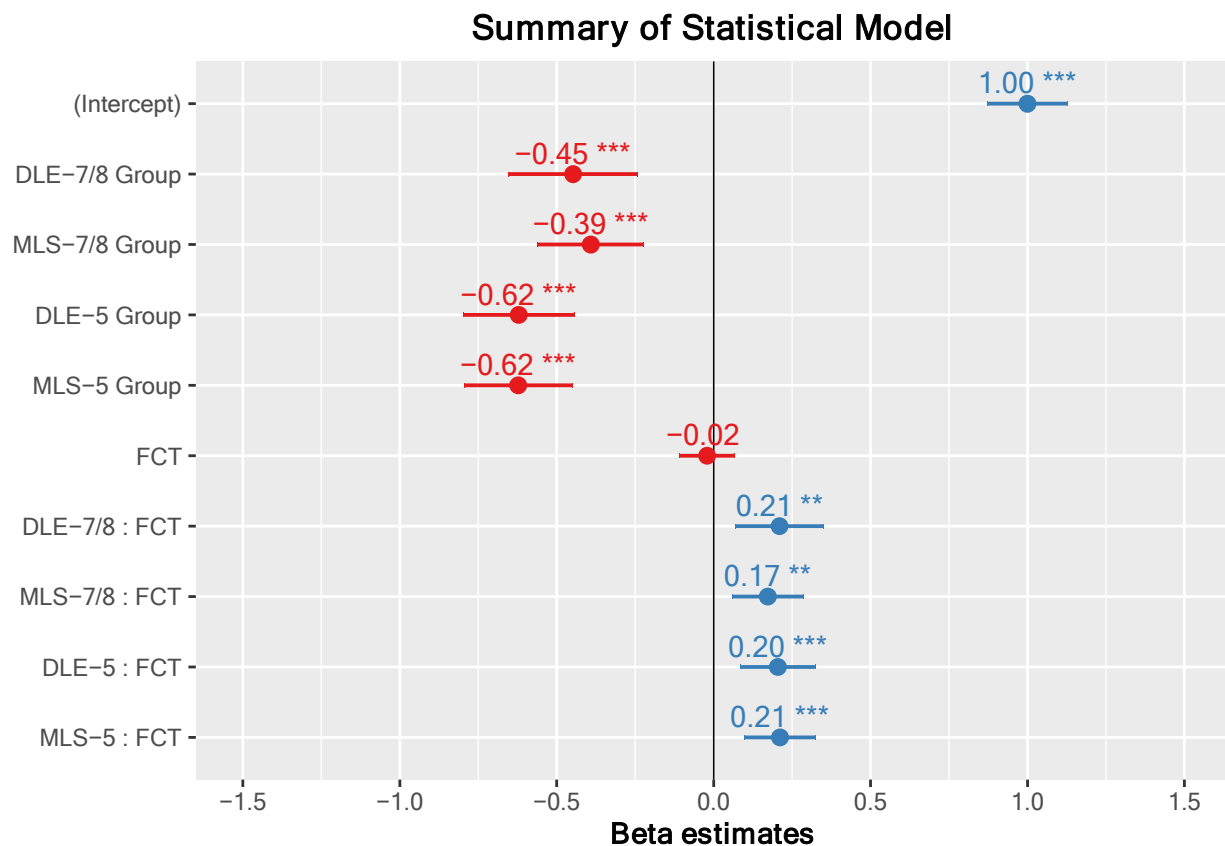
Table 7. Results of pairwise nested model comparisons.

Model/predictor	#	χ^2	AIC	BIC	logLik	Dev.	DF	p
Null	4	—	1418.0	1439.1	−705.00	1410.0	—	—
Group	8	41.526	1384.5	1426.7	−684.23	1368.5	4	< .0001
Task	9	20.687	1365.8	1413.2	−673.89	1347.8	1	< .0001
Group : Task	13	17.600	1356.2	1424.7	−665.09	1330.2	4	.0014

The resulting model revealed main effects that were significant at the $p < .05$ level for all four groups and their interaction with the FCT task. Table 8 lists the outputs of the statistical model and Figure 5 summarizes the results.

Table 8. Results of linear mixed effects model.

Fixed effect	β	CI-low	CI-high	SE	DF	t	p
Intercept	0.9998	0.874	1.125	0.0653	112.4	15.306	< .0001
DLE-7/8 group	-0.4477	-0.650	-0.244	0.1052	111.7	-4.254	< .0001
MLS-7/8 group	-0.3913	-0.557	-0.224	0.0863	114.5	-4.533	< .0001
DLE-5 group	-0.6208	-0.795	-0.446	0.0904	115.3	-6.863	< .0001
MLS-5 group	-0.6226	-0.791	-0.453	0.0874	112.0	-7.118	< .0001
FCT	-0.0207	-0.106	0.065	0.0442	221.1	-0.469	.6398
DLE-7/8 group : FCT	0.2100	0.070	0.350	0.0714	1344.1	2.941	.0033
MLS-7/8 group : FCT	0.1725	0.059	0.285	0.0572	1335.1	3.000	.0027
DLE-5 group : FCT	0.2046	0.086	0.323	0.0604	1332.0	3.387	.0007
MLS-5 group : FCT	0.2116	0.098	0.324	0.0578	1329.3	3.660	.0002

**Figure 5.** Results of linear mixed effects model.

While these analyses reveal that all four groups of HS were different from the SDB baseline, they do not explore the differences between HS in each age group and type of schooling. Therefore, Tukey post-hoc comparisons were necessary to determine HS groups' differences from one another. Table 9 summarizes these results, with adjusted p values for a family of five estimates,

in alignment with the five participant groups. None of the differences between HS groups was significant at the $p < .05$ level.

Table 9. Tukey post-hoc comparisons between groups in linear model.

Contrast	β	CI-low	CI-high	SE	DF	t	p
SDB – DLE-7/8	0.3427	0.065	0.619	0.0994	89.4	3.448	.0075
SDB – MLS-7/8	0.3050	0.079	0.530	0.0849	89.0	3.771	.0026
SDB – DLE-5	0.5185	0.282	0.755	0.0849	89.9	6.107	< .0001
SDB – MLS-5	0.5168	0.287	0.746	0.0823	88.5	6.279	< .0001
DLE-7/8 – MLS-7/8	–0.0377	–0.301	0.226	0.0947	89.9	–0.398	.9946
DLE-7/8 – DLE-5	0.1758	–0.097	0.449	0.0982	90.5	1.791	.3854
DLE-7/8 – MLS-5	0.1741	–0.093	0.441	0.0959	90.5	1.815	.3716
MLS-7/8 – DLE-5	0.2135	–0.007	0.434	0.0794	90.7	2.690	.0634
MLS-7/8 – MLS-5	0.2118	–0.001	0.425	0.0766	89.0	2.766	.0525
DLE-5 – MLS-5	–0.0017	–0.226	0.223	0.0808	90.0	–0.021	1.000

Because this five-level analysis of participant group did not reveal differences that were significant at the $p > .05$ level between HS groups, a second linear mixed effects model was prepared post-hoc using the HS’ data only with age group (fifth grade versus seventh/eighth grade), school (DLE versus monolingual school), and their interactions as fixed effects and participant and item as random effects. The older children and the DLE school were set as the baselines for age group and school, respectively. To verify the goodness of fit, pairwise nested model comparisons were carried out. The results of the pairwise comparisons revealed that only the model with age group was all significant at the $p < .05$ level, as reflected in Table 10. Therefore, the final model included a fixed effect for age group only. In the resulting model, there was a main effect for the fifth grade students ($\beta = -0.1993$, CI-Low = -0.3276 , CI-High = -0.0706 , SE = 0.0654, DF = 74.1, $t = -3.045$, $p = .0032$). This reaffirms that HS’ knowledge of subjunctive mood increased with age.

Table 10. Results of pairwise nested model comparisons.

Model/predictor	#	χ^2	AIC	BIC	logLik	Dev.	DF	p
Null	4	—	1346.0	1366.2	–669.00	1338.0	–	—
Age group	5	8.8922	1339.1	1364.4	–664.55	1329.1	1	.0026
School	6	0.0649	1341.0	1371.4	–664.52	1329.0	1	.7989
Age group : School	7	0.0824	1343.0	1378.4	–664.48	1329.0	1	.7740

5.4. Summary of Findings

The four research questions targeted the roles of exposure, age, and educational experience on HL acquisition and consistency between subjunctive production and selection. The results showed that SDB produced and selected the subjunctive in volitional clauses following the verb *querer* at ceiling, while HS showed considerable variability. The seventh and eighth grade groups produced and selected more subjunctive across tasks than HS in fifth grade; however, there was no difference between the students in the groups DLE-5 and MLS-5. All HS selected subjunctive mood more on a receptive task than they produced it.

Therefore, the prediction that DLE would facilitate acquisition of the subjunctive compared to monolingually-educated peers is not supported (see research question 1). Secondly, there is no evidence for the loss of mood knowledge in Spanish HS after graduating from a DLE program, although theory predicts that such a drop in exposure will result in the reassembly of HL features (see research question 2). The role of age partially supports the hypothesis for research question 3, as even in the face of a drop in exposure, children who had graduated from the DLE program produced and selected more subjunctive in this context (see research question 4). Finally, HS showed asymmetrical knowledge of subjunctive mood, whereby they selected this structure more on the FCT than they produced it in the EPT. Having briefly summarized these findings within the context of the research questions, it is now possible to turn to a more general discussion of results and their implications for HL acquisition and bilingual education programs.

5. Discussion

The present study has multiple implications for our understanding of the course of development for bilingual children, and how exposure affects the acquisition of late-developed structures more generally. In addition, these results allow us to explore how DLE shapes HL

acquisition. This study is in concert with all previous experimental work on Spanish HS' mood systems in showing that these speakers produce and select this structure less consistently than SDB. However, it departs from Dracos et al.'s (2022) and Flores et al.'s (2017) results, as it found no impact of patterns of patterns of exposure on results. Furthermore, although this study is consistent with Flores et al.'s (2017) finding that age modulates the development of this structure, there was no interplay between age and exposure.

The method through which exposure was addressed in this study differs from both of these previous experiments. The present study tested a prevalent assumption that DLE boosts HS' exposure to the HL, resulting in its accelerated development compared to bilingual children in monolingual schools. In contrast, Flores et al. (2017) operationalized patterns of language exposure by taking sibling order and number of Portuguese-speaking parents into account, while Dracos and Requena (2022) did so through a parental language questionnaire. Exposure to the HL at home may facilitate the development of subjunctive mood differently from at school, so future studies should consider both types of exposure in the statistical modeling. Importantly, additional data with a broader age range of participants may be necessary to provide a more concrete path that HS follow in their subjunctive development; while the present study had older children that were lacking in Dracos and Requena's (2022) study, it lacked data from younger children.

The HS' data from the present study align with some of Putnam and Sánchez's (2013) predictions but not others. Firstly, there was no role of type of education in the results obtained, which does not support the claim that quantity of exposure drives HL development. Secondly, in the face of a drop in exposure having graduated from the DLE program, participants in the DLE-7/8 group showed an *increase* in knowledge of subjunctive mood, rather than a decrease, as would be predicted by Putnam and Sánchez's (2013) theory of reassembly of features. However, HS did

show differences in their productive and receptive knowledge of mood, per the predictions of this theory. However, patterns of exposure do not modulate the degree of these asymmetries.

Moreover, the participants in both groups of seventh and eighth grade students produced subjunctive mood in approximately 60% of contexts, which is consistent with the production rates of subjunctive with regular verbs in Giancaspro et al.'s (2022) study. Although it is potentially problematic to compare cross-sectional results of two distinct studies, the consistency across them highlights the possibility that seventh and eighth grade HS have converged on the adult-like heritage mood system, and there does not appear to be any restructuring of mood morphology as HS reach adulthood.

However, Potowski (2007b) reported that 81% of the seventh and eighth grade HS in an 80/20 DLE program the subjunctive in the intensional/deontic sentence following the verb *pedir* (*to ask*), which pertains to the same syntactic context as the verb *querer* used in the present study. The DLE-7/8 in the present study produced the subjunctive in 55.2% of the expected contexts and selected it in 77.5% of the expected contexts. Since Potowski's experiment did not include age-matched groups of monolingually-educated children, it was not possible to extrapolate whether DLI had conferred the children in her study an advantage in their acquisition of mood relative to other HS. However, if exposure matters, HS in the 80/20 program in her study produced more subjunctive than participants of the same age enrolled in a 50/50 program. Therefore, more exposure to the HL may be necessary in order to observe differences in the acquisition of the subjunctive between HS students in DLE and in monolingual classrooms.

Through an analyses of the data across these studies, patterns of exposure could facilitate the acquisition of subjunctive mood, but not its restructuring. This is consistent with a recent study on adult HS, in which López Otero (2022) did not find that participants had restructured the

syntactic representations of word order with unergative and unaccusative predicates, even though patterns of exposure, as measured through frequency ratings and receptive vocabulary size, *did* affect results.

Before concluding, it is crucial to interpret these results with caution for two reasons. Firstly, they could easily be misconstrued as evidence against the effectiveness and vitality of DLE programs given the absence of an effect for education type in the results. Although this claim is contra the predictions of this study and the widely-held assumption that DLE guarantees an expedited acquisition of the HL, the absence of a difference between children in a single DLE school and those in a traditional education program cannot be interpreted as representative of the impact of this type of education program nationwide. However, it does elucidate the fact that, despite other, non-linguistic advantages (e.g., Bearse & de Jong, 2008; Christian et al., 2004; Garraffa et al., 2020; Nicolay & Poncelet, 2015; Thomas & Collier, 2002), greater exposure to Spanish may be necessary than what is offered in most DLE schools, where 50% of the curriculum is offered in Spanish or another partner language, to maximize HL development.

This also exposes an additional assumption of DLE schooling, in that children consistently produce and engage in use of the target language. Data against this assumption comes from Potowski's (2004) case study of two HS and two L2L in a DLE school, where the four children responded in English in 52% of their interactions despite receiving 100% of their input in Spanish. This great imbalance between production and comprehension is consistent with participants' asymmetrical performance across tasks in this study. In turn, this underscores the possibility that simply being exposed to the HL at school does not guarantee that HS develop stronger productive knowledge of the Spanish inflectional system, particularly with only 50% of the curriculum in Spanish. To this effect, Potowski (2007b) argues that DLE programs should focus on language

output, a factor that has been tied to L2 (Swain, 1985, 2000), and recently, HL development (Goldin, 2021; Sánchez et al., 2023). Secondly, this study took place shortly after school closures due to the COVID-19 pandemic. It is highly difficult to quantify the impact of the pandemic on language development, so future studies may wish to replicate these findings and/or to include children in a DLE school with more exposure to Spanish.

6. Conclusion

The present study tested the widespread assumption that children who attend DLE programs develop superior competence in their HL compared to peers in monolingual schools. Furthermore, it explored how age and changes in exposure characterized HS' knowledge of subjunctive mood in volitional clauses. While monolingual children acquire this structure before other syntactic contexts in which the subjunctive is used, research on adult populations has shown considerable variability in its use tied to patterns of exposure. However, there was no effect of exposure due to children's participation in – and subsequent graduation from – an immersion program: there was no difference between fifth graders in two educational contexts, and older children did not show a loss of mood knowledge after immersion, as would be predicted by Putnam and Sánchez's (2013) approach to HL acquisition. However, these results did find a facilitative effect for age, regardless of educational exposure, which aligns with Flores et al.'s (2017) study on the acquisition of subjunctive mood in Portuguese HS, and shows that HL acquisition continues into late childhood (see Corbet & Domínguez, 2020 or Cuza & Miller, 2015 for additional evidence of this claim). Finally, although the absence of exposure effects is contra Putnam and Sánchez's (2013) theoretical predictions, the asymmetrical knowledge between mood production and selection is consistent with these authors' approach.

Before closing, it is important to recognize the critical role that DLE has on linguistic justice for HS. It is imperative not to misinterpret these findings as counterevidence for the effectiveness of this inclusive method of schooling, particularly considering the academic, cognitive, and sociocultural benefits beyond language development. Rather, they suggest that multiple opportunities for language output and increasing instruction in Spanish may be essential in maximizing the opportunities that DLE programs provide to students to develop the language of their cultural and linguistic heritage.

For Peer Review

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