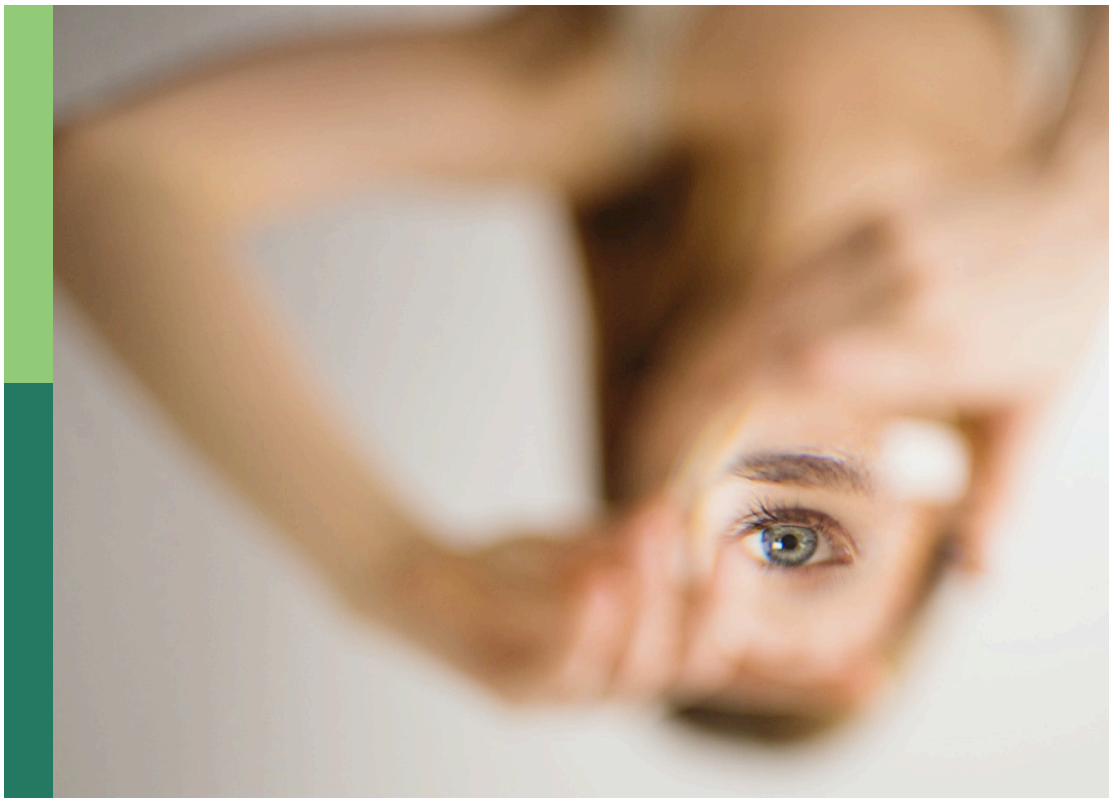
frontiers | Research Topics

# International mother language day: Enhancing home language development from a young age

**Edited by**
Natalia Meir, He Sun and Vicky Chondrogianni

**Published in**
Frontiers in Psychology
Frontiers in Communication



ISSN 1664-8714
ISBN 978-2-8325-3539-4
DOI 10.3389/978-2-8325-3539-4

## About Frontiers

Frontiers is more than just an open access publisher of scholarly articles: it is a pioneering approach to the world of academia, radically improving the way scholarly research is managed. The grand vision of Frontiers is a world where all people have an equal opportunity to seek, share and generate knowledge. Frontiers provides immediate and permanent online open access to all its publications, but this alone is not enough to realize our grand goals.

## Frontiers journal series

The Frontiers journal series is a multi-tier and interdisciplinary set of open-access, online journals, promising a paradigm shift from the current review, selection and dissemination processes in academic publishing. All Frontiers journals are driven by researchers for researchers; therefore, they constitute a service to the scholarly community. At the same time, the *Frontiers journal series* operates on a revolutionary invention, the tiered publishing system, initially addressing specific communities of scholars, and gradually climbing up to broader public understanding, thus serving the interests of the lay society, too.

## Dedication to quality

Each Frontiers article is a landmark of the highest quality, thanks to genuinely collaborative interactions between authors and review editors, who include some of the world's best academicians. Research must be certified by peers before entering a stream of knowledge that may eventually reach the public - and shape society; therefore, Frontiers only applies the most rigorous and unbiased reviews. Frontiers revolutionizes research publishing by freely delivering the most outstanding research, evaluated with no bias from both the academic and social point of view. By applying the most advanced information technologies, Frontiers is catapulting scholarly publishing into a new generation.

## What are Frontiers Research Topics?

Frontiers Research Topics are very popular trademarks of the *Frontiers journals series*: they are collections of at least ten articles, all centered on a particular subject. With their unique mix of varied contributions from Original Research to Review Articles, Frontiers Research Topics unify the most influential researchers, the latest key findings and historical advances in a hot research area.

Find out more on how to host your own Frontiers Research Topic or contribute to one as an author by contacting the Frontiers editorial office: frontiersin.org/about/contact

# International mother language day: Enhancing home language development from a young age

**Topic editors**

Natalia Meir — Bar-Ilan University, Israel

He Sun — Nanyang Technological University, Singapore

Vicky Chondrogianni — University of Edinburgh, United Kingdom

**Citation**

Meir, N., Sun, H., Chondrogianni, V., eds. (2023). *International mother language day: Enhancing home language development from a young age*. Lausanne: Frontiers Media SA. doi: 10.3389/978-2-8325-3539-4

# Table of contents

frontiers | Frontiers in Psychology

TYPE Original Research
PUBLISHED 25 November 2022
DOI 10.3389/fpsyg.2022.1016492



OPEN ACCESS

EDITED BY
He Sun,
Nanyang Technological University,
Singapore

REVIEWED BY
Rica Ramirez,
University of Texas at San Antonio,
United States
Vicky Chondrogianni,
University of Edinburgh,
United Kingdom

*CORRESPONDENCE
Rufan Luo
rufan.luo@asu.edu

SPECIALTY SECTION
This article was submitted to
Language Sciences,
a section of the journal
Frontiers in Psychology

RECEIVED 11 August 2022
ACCEPTED 31 October 2022
PUBLISHED 25 November 2022

CITATION
Luo R and Song L (2022) The unique and compensatory effects of home and classroom learning activities on Migrant and Seasonal Head Start children's Spanish and English emergent literacy skills.
*Front. Psychol.* 13:1016492.
doi: 10.3389/fpsyg.2022.1016492



# The unique and compensatory effects of home and classroom learning activities on Migrant and Seasonal Head Start children's Spanish and English emergent literacy skills

Rufan Luo[1,2]*and Lulu Song[3]

[1]School of Social and Behavioral Sciences, New College of Interdisciplinary Arts and Sciences, Arizona State University, Phoenix, AZ, United States, [2]Department of Psychology, Rutgers University-Camden, Camden, NJ, United States, [3]Department of Early Childhood Education/Art Education, Brooklyn College, The City University of New York, New York, NY, United States

Children of migrant and seasonal farmworkers (MSFW) are among the most underprivileged, underserved groups in the United States. The current study examined how home and classroom language and literacy experiences uniquely and interactively contributed to MSFW children's emergent literacy skills in English and Spanish. Participants were 255 Spanish-English dual language learning children ($M_{age}$=49 mon; 98.3% Latino/Hispanic) and their parents and 47 teachers, drawn from the Migrant and Seasonal Head Start (MSHS) Study. Parents reported how often the target children engaged in language and literacy activities (i.e., teaching letters, words, or numbers, book-reading, singing, and storytelling) with their family members. Teachers reported how often the target children engaged in classroom language and literacy activities (e.g., book-reading, learning letters, retelling stories, etc.). Children's emergent literacy skills in English and Spanish were assessed by standard tests. After controlling for demographic variables, home and classroom language and literacy activities uniquely predicted children's emergent literacy skills in Spanish, but not in English. Additionally, home and classroom activities compensated one another in supporting children's English and Spanish emergent literacy development. That is, language and literacy activities in one context showed a stronger effect for children who experienced less frequent activities in the other context. Together, these findings shed light on ways to support MSFW children's emergent literacy skills and reveal the importance of integrating and connecting home and school learning experiences.

KEYWORDS

**dual language learners, Migrant and Seasonal Head Start, emergent literacy, home language and literacy activities, classroom language and literacy activities**

## Introduction

In the United States, there are 2.5–3 million migrant and seasonal farmworkers (MSFW; National Center for Farmworker Health (NCFH), 2020), most of whom are foreign born (75%), self-identified as Hispanic/Latino (83%), and used Spanish as their primary language (77%; National Center for Farmworker Health (NCFH), 2020). They have an average education level of 8th grade, and approximately one third of them are living below the poverty line (National Center for Farmworker Health (NCFH), 2020). Young children of MSFW families are among the most underprivileged, underserved groups in the United States (Mathur and Parameswaran, 2012), facing developmental obstacles such as food insecurity, unstable and crowded housing, language and cultural barriers, and limited access to educational and healthcare services (Perreira et al., 2006; Barrueco, 2012; Tavassolie et al., 2018). To date, most studies have focused on MSFW children's mental and physical health (Kupersmidt and Martin, 1997; Beltran, 2010; Taylor and Ruiz, 2017), with a scarcity of work on their development of early language and literacy skills. As a branch of the Head Start program (a federal program providing free early childhood education to low-income families), the Migrant and Seasonal Head Start (MSHS) program has been designed to offer high-quality, culturally appropriate child development and family support to MSFW families across 38 states in the United States (Early Childhood Learning and Knowledge Center (ECLKC), 2022), providing a valuable context for studying MSFW children's language and literacy development and experiences.

Children's emergent literacy skills, such as their knowledge of letters and words, phonological awareness, and print concepts, are important precursors of future reading skills and academic success (Lonigan et al., 2000). Most MSFW children are Spanish-English dual language learners (DLLs), who are exposed to Spanish at home and English at preschool during the months they are enrolled in MSHS programs (Mathur and Parameswaran, 2012). Given their limited English experiences, many MSFW children struggle with emergent literacy in English, which could later become a barrier for school achievement (Tavassolie et al., 2018). A study of MSFW children in Florida showed that, even though children made progress in their English over time, only 43% of the children reached the developmental benchmark in English at the end of preschool; and in kindergarten, 52% and 23% of MSFW children were at high and medium risk in their development of English emergent literacy skills (Tavassolie et al., 2018). Additionally, MSFW parents express concerns regarding their children's Spanish loss (Smith and Johnson, 2019). Spanish is critical for children to develop their Latino identity, learn about their culture and heritage, and communicate with family members. Yet, MSFW children tend to use less Spanish after being exposed to English in preschool (Smith and Johnson, 2019).

Language and literacy activities in both the home and classroom contexts offer children important opportunities to develop emergent literacy skills (Hammer et al., 2014; Piasta, 2016). However, very few studies have examined MSFW children's home and classroom experiences simultaneously. The current study asked how home and classroom language and literacy activities uniquely predicted MSFW children's emergent literacy skills in English and Spanish; and whether home and classroom activities interacted with each other in their contributions to children's emergent literacy skills.

### Home language and literacy activities and children's emergent literacy skills

Ample research has demonstrated the effect of home language and literacy experiences on children's emergent literacy skills (e.g., Reese et al., 2010; Farver et al., 2013). In particular, the frequency of language and literacy activities (e.g., book-reading, teaching letters and words, storytelling, and singing songs) is found to relate to children's emergent literacy skills (Reese et al., 2000; Raikes et al., 2006; Rodriguez and Tamis-LeMonda, 2011).

Book-reading exposes children to language input that is diverse, complex, and cognitively demanding (Peterson and McCabe, 1994; Soderstrom and Wittebolle, 2013; Tamis-LeMonda et al., 2018). Both correlational and intervention work has revealed the benefits of frequent book-reading for early language and literacy development (Bus et al., 1995; Raikes et al., 2006; Noble et al., 2019). Studies with low-income, Latino families also documented the links between book-reading frequency and children's emergent literacy skills in both English and Spanish (Farver et al., 2013; Gonzalez et al., 2017; Shen and Del Tufo, 2022). For instance, in a sample of Latino Head Start children, parents' engagement with children in literacy activities in English and Spanish predicted children's emergent literacy skills in both languages (Farver et al., 2013). Importantly, parent–child book-reading in one language might benefit children's emergent literacy skills in the other language. One study showed that the frequency of mother–child book-reading, which was primarily conducted in Spanish only or both English and Spanish, predicted Latino children's receptive vocabulary in English during preschool years (Gonzalez et al., 2017).

Other than book-reading, parental engagement in code-related activities such as teaching children how to read and write letters and words also support the development of emergent literacy skills (Sénéchal and Lefevre, 2002, 2014; Haney and Hill, 2004; Hood et al., 2008; Inoue et al., 2018). For example, a three-year longitudinal study has suggested that the frequency of parental teaching of literacy skills predicted children's concurrent emergent literacy skills at preschool and their reading and spelling skills in 1st and 2nd grades (Hood et al., 2008). Similar findings have been observed in monolingual Spanish-speaking samples. For example, a study with low-socioeconomic status Chilean families found that mothers who frequently taught children how to read and write letters had children who showed better letter-word identification skills (Mendive et al., 2020).

Additionally, learning activities that do not rely on print materials, such as storytelling and singing, are highly valued in

Latino and/or MSFW families as essential ways to support children's language and literacy development and convey cultural lessons (Luo and Tamis-LeMonda, 2019; van der Pluijm et al., 2019). It is therefore critical to include these non-print activities in the examination of home experiences. Indeed, studies using combined measures of children's engagement in book-reading, storytelling, and singing have found positive associations between the frequency of these activities and children's early language and/or emergent literacy skills in infancy and preschool years (Rodriguez et al., 2009; Tamis-LeMonda et al., 2019; Song et al., 2022).

Fewer studies have examined children's language and literacy experiences in MSFW families. Constraints such as long working hours, high illiteracy rates, limited access to learning materials, and unfamiliarity with the U.S. education system present challenges for MSFW parents to support their children's early literacy development (Mehta et al., 2000; Perreira et al., 2006; Tavassolie et al., 2018). Nonetheless, MSFW parents value education and have high dedication to and expectation for their children (O'Brien et al., 2011; Barrueco, 2012; Smith and Johnson, 2019). Qualitative research has shown that MSFW parents engaged their children in a variety of reading and writing activities, including but not limited to reading books, messages, and letters from their families, reading and writing alphabetic letters and children's names, reading the Bible, and telling stories (Lynch, 2008; Purcell-Gates, 2013). In a study of 48 MSHS children, researchers examined children's emergent literacy skills and their home literacy experiences (e.g., book-reading frequency, access to books in English and Spanish), and found that the composite score of home literacy experiences predicted children's emergent literacy skills in their dominant language (Ezell et al., 2000). Intervention studies aiming to promote language and literacy activities in MSFW or migrant families have also shown positive effects on children's early language and literacy skills (Boyce et al., 2010; St. Clair et al., 2012).

## Classroom language and literacy activities and children's emergent literacy skills

The quantity/frequency of classroom language and literacy activities has been found to support children's emergent literacy skills (Xue and Meisels, 2004; Connor et al., 2006; Guarino et al., 2006; Zucker et al., 2013). For example, in a study with a culturally and linguistically diverse sample, pre-k children who spent more time in teacher-directed activities such as book-reading showed greater gains in their emergent literacy skills over the school year (Pianta et al., 2020). Longitudinal studies have also found that the duration or frequency of language and literacy activities in preschool or kindergarten predicted children's language and emergent literacy growth from pre-k to kindergarten (Christopher and Farran, 2020) and their gains in reading skills from kindergarten to 5$^{th}$ grade (Sonnenschein et al., 2010). These findings highlight the facilitative role of classroom language and literacy activities in children's early literacy development.

Most children in the MSHS programs are DLLs and speak Spanish as their primary language (Stechuk and Burns, 2005). Yet, research on Spanish-English DLLs' classroom language and literacy experiences is still limited. Like their monolingual peers, DLLs benefit from frequent, high-quality language and literacy instructions (Gersten and Geva, 2003; Graves et al., 2004; Gersten et al., 2005; Baker et al., 2006; Cirino et al., 2007). At the same time, it is crucial for teachers to provide DLLs with culturally and linguistically responsive instructions and support their home language development (Castro et al., 2011; Sawyer et al., 2016). For example, Head Start teachers' instructional support in the DLLs' home language (e.g., quantity of Spanish use, instructional strategies such as questioning and literacy materials in Spanish) has been found to predict DLLs' home language skills (White et al., 2020). Other studies comparing bilingual and English-only programs have also suggested that bilingual programs support children's Spanish development without slowing down their English acquisition (Collier and Thomas, 2004; Rolstad et al., 2005; Barnett et al., 2007; Figueras-Daniel and Li, 2021). Nonetheless, observations of preschool teachers' classroom practices with DLLs have suggested that teachers tend to use few linguistically responsive practices (e.g., providing key words in children's home language, giving children opportunities to use both English and the home languages) and more basic, low-quality language and literacy instructions (e.g., not using many open-ended questions or advanced vocabularies) with DLLs (Justice et al., 2008; Sawyer et al., 2016).

To date, few studies have examined teachers' language and literacy practices in MSHS classrooms in relation to children's developmental outcomes. One intervention study found that training teachers to use high-quality instructions (e.g., building children's vocabulary, engaging children in book-reading, and implementing classroom activities in a playful and effective way) during classroom language and literacy activities promoted MSHS children's emergent literacy growth in English and Spanish (Solari et al., 2016).

## The unique and interactive effects of home and classroom experiences

Most research has examined the effects of children's home and classroom language and literacy experiences separately, without asking how these two components of children's learning experiences uniquely contribute to the development of emergent literacy skills and whether they interact with one another. The bioecological model posits that children's immediate contexts (e.g., home and classroom settings) are not independent. Rather, various developmental contexts interact with each other in their contribution to child outcomes (Bronfenbrenner and Morris, 2006). Similarly, the multisystemic approach proposes that child development unfolds within an interconnected system of

individual, family, and extra-familial (e.g., school, community) factors (Barrueco, 2012). It is therefore necessary to consider children's home and school experiences simultaneously in minority, marginalized populations.

Studies examining the unique effect of home and classroom language and literacy experiences have yielded mixed findings. One study examined the effect of home and classroom literacy experiences (e.g., book-reading frequency and the availability of literacy materials in the home and classroom settings) on the emergent literacy skills of children enrolled in MSHS programs and found that home literacy experiences was a stronger predictor than classroom literacy experiences (Ezell et al., 2000). However, a study with Turkish 5-year-olds found that classroom literacy experiences (e.g., the availability of books, book-reading and early writing activities, etc.), but not home literacy experiences (e.g., number of books, book-reading frequency, etc.), predicted children's emergent literacy skills 4 months later (Altun et al., 2018). Other studies have documented the unique roles of both home and classroom experiences. For example, a reading intervention study compared three conditions, a classroom only condition in which teachers were trained to read to children using the dialogic reading approach, a classroom plus home condition in which both teachers and parents were trained to read to children using the same approach, and a control condition (Whitehurst et al., 1994). While both treatment conditions improved children's early language skills, the classroom plus home condition had a stronger effect than the classroom only condition. Another study found that 3-year-old children who had better home literacy experiences and whose preschool center had higher levels of average child ability (a potential indicator of center quality) showed more advanced literacy skills at 1st and 3rd grades (Melhuish et al., 2008).

To date, no studies to our knowledge have examined the interaction between home and school language and literacy activities in relation to MSFW children's emergent literacy skills. However, studies with other populations have suggested that home and classroom experiences may shape child development in a compensatory manner, such that rich, high-quality language and literacy experiences in one context may compensate the poor experiences in the other context (Magnuson et al., 2004; McCartney et al., 2007; Crosnoe et al., 2010; Vernon-Feagans et al., 2013). For example, Vernon-Feagans et al. (2013) found children who received less complex maternal language input at home to benefit more from positive caregiver–child verbal interactions. Other studies have also shown that high-quality classroom experiences matter more for children with poorer home learning experiences due to factors such as low-income, low maternal education, and single parenthood (Magnuson et al., 2004; McCartney et al., 2007; Crosnoe et al., 2010). Home literacy experiences can also compensate the lack of language and literacy support in the classroom context. For example, one study found that DLL children's engagement in home literacy activities in their heritage language predicted their vocabulary growth in the societal language, but only for those who received low levels of classroom language stimulation (Willard et al., 2021).

In contrast to the compensatory hypothesis, some studies found little evidence that children from more disadvantaged families would benefit more from high-quality classroom experiences (Burchinal et al., 2000). There is even some evidence suggesting that children with stimulating home experiences might be better prepared for learning in the classroom, indicating a complementary relationship of home and school experiences. A study with a low-income sample found that high-quality childcare positively predicted children's emergent literacy skills only for those children exposed to high cognitive stimulation at home (Votruba-Drzal et al., 2004). Similarly, a study of Head Start children suggested a greater effect of classroom quality on children's problem solving and reasoning for those children with better home learning experiences (e.g., frequent language and literacy activities, abundant learning materials and toys, and warm, non-punitive parenting behaviors; Bryant et al., 1994). Perhaps, children need to reach a certain skill level before taking advantage of their classroom experiences (Vygotsky, 1978), and linguistically and cognitively stimulating home experiences play a key role in helping children achieve the threshold.

## The current study

To better understand the unique and interactive effects of home and classroom literacy activities on MSHS children's emergent literacy skills, we asked two research questions:

1. How do home and classroom language and literacy activities uniquely contribute to MSHS children's emergent literacy skills in English and Spanish? We hypothesized that frequencies of language and literacy activities in both the home and classroom settings would account for unique variances in MSHS children's emergent literacy skills.
2. Do home and classroom language and literacy activities interact with each other in their contributions to children's English and Spanish literacy skills? If home and classroom activities benefit child development in a compensatory way, we would expect classroom language and literacy activities to show a stronger positive effect for children who experienced less frequent language and literacy activities at home, and vice versa. Alternatively, if home and classroom activities work in a complementary way, we would expect the effect of classroom activities to be stronger for those children who more frequently engaged in language and literacy activities at home.

# Methods

## Participants

Participants were drawn from the Migrant and Seasonal Head Start (MSHS) Study (Caswell et al., 2020), which aimed to understand the characteristics of MSHS programs, children, and families, the quality of MSHS services and practices, and the relation between MSHS characteristics and the outcomes of children and families (Caswell et al., 2019). The study involved a nationally representative sample of 122 MSHS classrooms, 234 lead and assistant teachers, 873 children, and 778 parents (Caswell et al., 2019). Data was collected between January 2017 and January 2018, *via* MSHS staff surveys, parent interviews, classroom observations, and direct child assessments.

Of the original 873 children, 255 had valid data on emergent literacy skills in English and/or Spanish, parental report of home language and literacy activities, and teachers' report of classroom language and literacy activities. Given that children were only assessed in English and Spanish, we further excluded 20 preschoolers exposed to a home language other than English or Spanish. Thus, the final analytic sample included 235 children and their parents (one parent of each child) and 47 lead teachers. Table 1 presents the demographic information of the sample. On average, children (51.49% males) were 49 months of age ($SD = 9.17$) at the time of assessment. Almost all of them (98.3%) were identified by their parents as Latino/Hispanic. Most participating parents were mothers (88.9%) and had elementary to high school education levels (62.4%). About 82% of the parents reported using all Spanish or more Spanish than English with their children. The teachers' education levels ranged from high school to graduate education (see Table 1 for more details).

## Measures

### Home language and literacy activities

Parents were interviewed about how many days in the past week they themselves or someone in the family engaged in each of the four types of activities in any language with the target child: teaching the child letters, words, or numbers, reading or looking at books, singing songs, and telling stories (1– zero days, 2 – 1 to 2 days a week, 3 – 3 to 4 days a week, and 4 – 5 to 7 days a week). An average score across these 4 activities was calculated, with higher scores indicating more frequent language and literacy activities at home ($M = 2.87$, $SD = 0.71$, *Range* = 1–4, Cronbach's Alpha = 0.69).

### Classroom language and literacy activities

Teachers were asked about how often children in their class engaged in each of the eight types of language and literacy activities in any language in a survey: learning the names of letters, writing children's own names, learning about the conventions of print, retelling stories, listening to stories read by teachers, working on phonics, discussing new words, and practicing writing alphabets (1 – never, 2 – about once a month or less, 3 – two to three times a month, 4 – once or twice a week, 5 – three to four times a week, 6 – every day). An average score was calculated to indicate how frequently children engaged in these eight activities ($M = 5.46$, $SD = 0.57$, *Range* = 2.5–6, Cronbach's Alpha = 0.80).

### Emergent literacy skills

Children's emergent literacy skills in English and Spanish were assessed using the Letter-Word Identification (English) and Identificación de letras y palabras (Spanish) scales on the Woodcock-Muñoz Language Survey–Revised Normative Update (WMLS-R NU; Woodcock et al., 2005). These assessments examine children's knowledge of the alphabet and their ability to read single words (Cronbach's Alpha = 0.87 for English and 0.85 for Spanish; Caswell et al., 2019). All children were assessed in both English and Spanish, starting with the child's dominant language as reported by their parents. The English and Spanish standard scores were used for analyses. It is important to note that the norms were based on English-speaking and Spanish-speaking monolingual samples. Although the standard scores captured individual differences among children, they likely underestimated DLLs' skill levels and must be interpreted with caution.

### Covariates

A group of demographic variables were controlled for in the analyses. At the child/family level, we controlled for children's age, gender, the total number of children living in the household, parental education, and parents' relative language use with the child (1-All English, 3-Same amount of Spanish and English, and 5-All Spanish). According to the MSHS dataset, parental education was coded based on a scale, ranging from 1 (no school) to 25 (professional degree; see more details in Table 1 Notes). At the classroom level, we included teachers' education level (1-less than high school diploma, 5-higher than Bachelor's degree) and instructional language. Teachers reported on the language(s) they used when teaching children, reading to children, and presenting information, on a scale from 1 (English completely) to 5 (Spanish completely). An average score was calculated to indicate teachers' relative use of English and Spanish ($M = 2.57$, $SD = 1.25$, *Range* = 1–5). Across the sample, teachers used slightly more English than Spanish.

# Analytic plan

As shown in Table 1, the proportions of missing values were low, ranging from 0 to 7.7%. The Little's Missing Completely at Random (MCAR) test suggested that data were missing completely at random ($Chi^2 = 18.63$, $p = 0.91$). Multiple imputation was conducted in STATA 17.0 to handle missing values among the control variables (Stata Corp, 2021). The multiple imputation model included all covariates, with and without missing values, such that the missing values were predicted based on existing data.

TABLE 1 Descriptive statistics for demographic variables, home and classroom language and literacy activities, and children's emergent literacy skills in English and Spanish.

| | *Mean or Percentage* | *SD* | *Range*[a] | Missing (%) |
|---|---|---|---|---|
| **Child characteristics** ($n = 235$) | | | | |
| Gender (male) | 51.49% | | | 0% |
| Latino/Hispanic | 98.29% | | | 0.43% |
| Child age in month at English assessment | 49.10 | 9.17 | | 1.30% |
| Child age in month at Spanish assessment | 49.08 | 9.18 | | 0.90% |
| **Family characteristics** ($n = 235$) | | | | |
| Total number of children living in the household | 2.01 | 1.30 | | |
| Parent relationship with the child | | | | |
| Mother | 88.94% | | | |
| Father | 9.79% | | | |
| Grandparents | 0.43% | | | |
| Other | 0.85% | | | |
| Parental education[b] | | | 1–21.5 | 0.43% |
| No school | 1.71% | | | |
| 1th–6th grade | 22.7% | | | |
| 7th–12th grade, no diploma | 40.6% | | | |
| High school diploma/Equivalent | 21.8% | | | |
| Vocational/technical school | 2.1% | | | |
| Some college, no degree | 8.6% | | | |
| Bachelor's degree or some graduate school without a degree | 2.6% | | | |
| Parental language use with the target child | | | | 7.66% |
| All English | 0.46% | | | |
| More English than Spanish | 14.29% | | | |
| Same amount of Spanish and English | 3.23% | | | |
| More Spanish than English | 32.72% | | | |
| All Spanish | 49.31% | | | |
| **Teacher characteristics** ($n = 47$) | | | | |
| Teacher educational level | | | | *0%* |
| High school diploma | 17.02% | | | |
| Vocational/technical school | 12.77% | | | |
| Associate's degree | 38.30% | | | |
| Bachelor's degree | 25.53% | | | |
| Higher than Bachelor's degree | 6.38% | | | |
| Teacher instructional language (1-English Completely, 5-Spanish completely) | 2.57 | 1.25 | 1–5 | 2.13% |
| **Key variables** | | | | |
| Frequency of home language and literacy activities (1-zero days, 4-5 to 7 days a week) | 2.87 | 0.71 | 1–4 | 0% |
| Teach letters, words, or numbers | 2.93 | 0.80 | 1–4 | |
| Read or look at books | 2.85 | 0.99 | 1–4 | |
| Tell stories | 2.71 | 1.06 | 1–4 | |
| Sing songs | 3.00 | 1.05 | 1–4 | |
| Frequency of classroom language and literacy activities (1-never, 6-every day) | 5.21 | 0.86 | 2.5–6 | 0% |
| Learn the names of letters | 5.52 | 1.05 | 1–6 | |
| Practice writing the letters of the alphabet | 4.57 | 1.60 | 1–6 | |
| Discuss new words | 5.49 | 0.86 | 3–6 | |
| Work on phonics (e.g., rhyming, sounds of letters) | 5.13 | 1.39 | 1–6 | |
| Listen to you read stories | 5.85 | 0.47 | 4–6 | |
| Retell stories | 5.23 | 1.20 | 1–6 | |

*(Continued)*

TABLE 1 (Continued)

| | *Mean or Percentage* | *SD* | *Range*[a] | Missing (%) |
|---|---|---|---|---|
| Learn about conventions of print (e.g., left to right orientation) | 5.23 | 1.46 | 1–6 | |
| Write children's own name | 4.62 | 1.73 | 1–6 | |
| Child English emergent literacy skills (standard scores) | 83.69 | 12.84 | 32–134 | 1.30% |
| Child Spanish emergent literacy skills (standard scores) | 94.79 | 12.42 | 45–137 | 0.90% |

[a]Minimum and maximum values of identifiable information (i.e., age, household size) are not released to protect data confidentiality.
[b]According to the MSHS dataset, parental education was coded as: 1-no school, 2-preschool, 3-kindergarten, 4 to 14-1st grade to 11th grade, 15–12th grade without a diploma, 16-high school diploma or equivalent, 17-vocational/technical program, 18-vocational/technical diploma, 19-some college, no degree, 20-Associate's degree, 21.5- Bachelor's degree or some graduate school without a degree, 23-Master's degree, 24-Doctoral degree, and 25-professional degree.

Twenty imputed datasets were generated, and findings were based on pooled estimates.

Because children and families were nested within classrooms, multilevel modeling was conducted using the *mixed* command of STATA 17.0 to examine the effects of child-level (i.e., home language and literacy activities) and classroom-level (i.e., classroom language and literacy activities) factors, accounting for variation between classrooms. First, unconditional models were conducted to estimate the amount of variance explained by differences among individual children (Level 1) and classrooms (Level 2). Second, to examine the contributions of home and classroom language and literacy activities to children's emergent literacy skills (Research Question 1), a set of two-level random intercept models were estimated, using home language and literacy activities as the key predictor at Level 1, and classroom language and literacy activities as the key predictor at Level 2. Models were estimated separately for English and Spanish literacy skills. Finally, to examine whether home and classroom activities interact with each other in their contributions to emergent literacy skills (Research Question 2), a cross-level interaction term between the home and classroom language and literacy activities was added to the models described above. When the interaction term was significant, we further estimated the conditional effects of classroom language and literacy activities, when the frequency of home language and literacy activities was set to be either low (i.e., 15$^{th}$ percentile of the analytic sample) or high (i.e., 85$^{th}$ percentile). The *nlcom* command of STATA was used after model estimation to compute point estimates, standard errors, *p* values, and confidence intervals for different combinations of parameter estimates (e.g., the effect of one predictor given a specific value of another predictor; Stata Corp, 2021). Likewise, we also estimated the effects of home language and literacy activities, when the frequency of classroom activities was low or high (i.e., 15$^{th}$ and 85$^{th}$ percentiles). In each model, covariates of the home and classroom contexts were included at Level 1 (i.e., child age, gender, parental education, parental Spanish use, total number of children in the household) and Level 2 (i.e., teachers' educational level, teachers' instructional language) respectively.

# Results

Table 1 presents descriptive statistics for the key predictors and outcome variables. Children showed enormous variation in their English and Spanish emergent literacy skills (*range* = 32–134 for English and 45–137 for Spanish), with an average standard score of 83.64 (*SD* = 12.84) for English emergent literacy and 94.79 (*SD* = 12.42) for Spanish emergent literacy, suggesting that overall children had better literacy skills in Spanish than in English ($p < 0.001$). Notably, the standard scores must be interpreted with caution, because the norm used was based on English-speaking and Spanish-speaking samples.

## Unconditional models

Unconditional models suggested that 73.23% and 82.84% of the variances in English and Spanish emergent literacy skills could be attributed to the differences among individual children, respectively; whereas 26.77% and 17.16% of the variances in English and Spanish emergent literacy skills could be explained by the differences among classrooms, respectively. In the models below, we included a random intercept to account for between-classroom differences.

## Unique contributions of home and classroom language and literacy activities

As shown in Model A (Table 2), neither home nor classroom language and literacy activities uniquely predicted MSHS children's emergent literacy skills in English, after controlling for demographic covariates and parents' and teachers' relative English and Spanish use. However, both the home ($b = 3.82$, $SE = 1.12$, $p < 0.001$, 95% $CI = [1.63, 6.00]$) and classroom ($b = 3.31$, $SE = 1.43$, $p = 0.021$, 95% $CI = [0.50, 6.12]$; see Model C, Table 2) activities uniquely predicted children's emergent literacy skills in Spanish. Children who experienced more frequent language and literacy activities at home and in the classroom showed better Spanish literacy skills.

TABLE 2 Home and classroom language and literacy activities predicting emergent literacy skills in English and Spanish.

| | *Coef.* | *S.E.* | *p* | *95% C.I.* | | *Coef.* | *S.E.* | *p* | *95% C.I.* | |
|---|---|---|---|---|---|---|---|---|---|---|
| English literacy skills ($n = 232$) | | | Model A | | | | | Model B | | |
| Intercept | **88.76** | **11.83** | **0.000** | **65.57** | **111.95** | 26.09 | 31.25 | 0.404 | −35.15 | 87.33 |
| *Child level covariates* | | | | | | | | | | |
| Child age | −0.06 | 0.10 | 0.541 | −0.25 | 0.13 | −0.05 | 0.10 | 0.603 | −0.24 | 0.14 |
| Child gender (boy) | **−3.65** | **1.66** | **0.028** | **−6.90** | **−0.40** | **−3.78** | **1.64** | **0.021** | **−7.00** | **−0.56** |
| Total # of children at home | −1.22 | 0.64 | 0.057 | −2.48 | 0.03 | **−1.39** | **0.64** | **0.030** | **−2.64** | **−0.13** |
| Parental edu | −0.07 | 0.22 | 0.757 | −0.49 | 0.36 | −0.10 | 0.21 | 0.645 | −0.52 | 0.32 |
| Parental Spa use | 0.10 | 0.94 | 0.912 | −1.74 | 1.95 | 0.16 | 0.93 | 0.865 | −1.67 | 1.99 |
| *Classroom level covariates* | | | | | | | | | | |
| Teachers' edu | −0.04 | 1.04 | 0.967 | −2.08 | 1.99 | −0.07 | 1.02 | 0.947 | −2.07 | 1.93 |
| Teachers' instructional lang | −0.61 | 1.03 | 0.551 | −2.63 | 1.41 | −0.64 | 1.01 | 0.526 | −2.63 | 1.34 |
| *Key predictors* | | | | | | | | | | |
| Home activities | 1.40 | 1.20 | 0.245 | −0.96 | 3.75 | **22.73** | **9.93** | **0.022** | **3.26** | **42.20** |
| Classroom activities | 0.07 | 1.73 | 0.966 | −3.31 | 3.46 | **11.70** | **5.64** | **0.038** | **0.65** | **22.75** |
| *Interaction* | | | | | | | | | | |
| Home activities × Classroom activities | | | | | | **−3.95** | **1.82** | **0.031** | **−7.52** | **−0.37** |
| Spanish literacy skills ($n = 233$) | | | Model C | | | | | Model D | | |
| Intercept | **60.90** | **10.16** | **0.000** | **40.98** | **80.81** | 4.45 | 28.47 | 0.876 | −51.35 | 60.25 |
| *Child level control variables* | | | | | | | | | | |
| Child age | −0.15 | 0.09 | 0.085 | −0.32 | 0.02 | −0.14 | 0.09 | 0.098 | −0.31 | 0.03 |
| Child gender (boy) | −1.14 | 1.53 | 0.459 | −4.14 | 1.87 | −1.25 | 1.52 | 0.411 | −4.23 | 1.73 |
| Total # of children at home | −0.98 | 0.59 | 0.097 | −2.13 | 0.18 | −1.14 | 0.59 | 0.052 | −2.30 | 0.01 |
| Parental edu | 0.10 | 0.20 | 0.629 | −0.29 | 0.48 | 0.07 | 0.20 | 0.724 | −0.31 | 0.45 |
| Parental Spa use | **3.20** | **0.83** | **0.000** | **1.58** | **4.82** | **3.27** | **0.82** | **0.000** | **1.66** | **4.88** |
| *Classroom level control variables* | | | | | | | | | | |
| Teachers' edu | −0.12 | 0.77 | 0.875 | −1.64 | 1.40 | −0.13 | 0.77 | 0.869 | −1.63 | 1.38 |
| Teachers' instructional lang | 0.26 | 0.76 | 0.733 | −1.23 | 1.76 | 0.24 | 0.75 | 0.747 | −1.23 | 1.72 |
| *Key predictors* | | | | | | | | | | |
| Home activities | **3.82** | **1.12** | **0.001** | **1.63** | **6.00** | **22.83** | **9.03** | **0.011** | **5.13** | **40.53** |
| Classroom activities | **3.31** | **1.43** | **0.021** | **0.50** | **6.12** | **13.77** | **5.13** | **0.007** | **3.72** | **23.82** |
| *Interaction* | | | | | | | | | | |
| Home activities × Classroom activities | | | | | | **−3.52** | **1.66** | **0.034** | **−6.77** | **−0.27** |

Bolded predictors were significant at the $\alpha = 0.05$ level.

## Interaction between home and classroom language and literacy activities

In both the English and Spanish models, the interaction term between home and classroom language and literacy activities was significant, indicating that the home and classroom activities moderated the effect of one another on children's emergent literacy skills (see Models B and D, Table 2).

Specifically, the effect of classroom language and literacy activities was stronger for children who experienced less frequent language and literacy activities at home. For children who engaged in home language and literacy activities almost every day (i.e., 85$^{th}$ percentile or frequency of home activities = 3.6), classroom language and literacy activities did not predict children's English ($b = -2.50$, $SE = 2.08$, $p = 0.228$, 95% $CI = [-6.58, 1.57]$; upper half of Table 3) or Spanish ($b = 1.09$, $SE = 1.76$, $p = 0.535$, 95% $CI = [-2.36, 4.55]$; lower half of Table 3) literacy skills. However, for children who engaged in home language and literacy activities only 1 to 2 days a week (i.e., 15th percentile or frequency of home activities = 2), classroom activities significantly contributed to children's Spanish literacy skills ($b = 6.73$, $SE = 2.15$, $p = 0.002$, 95% $CI = [2.52, 10.93]$). Although the conditional effect was non-significant for children's English literacy skills, the coefficient changed from negative to positive ($b = 3.81$, $SE = 2.43$, $p = 0.117$, 95% $CI = [-0.95, 8.56]$; see Table 3) as the frequency of home literacy activities decreased, revealing a similar trend.

TABLE 3 Conditional effects of home and classroom language and literacy activities on children's emergent literacy skills in English and Spanish.

| | *Coef.* | *S.E.* | *p* | 95% *C.I.* | |
|---|---|---|---|---|---|
| *Outcome: English literacy skills* | | | | | |
| Effect of classroom language and literacy activities | | | | | |
| High frequency of home activities (i.e., almost 5–7 days a week) | −2.50 | 2.08 | 0.228 | −6.58 | 1.57 |
| Low frequency of home activities (i.e., 1–2 times a week) | 3.81 | 2.43 | 0.117 | −0.95 | 8.56 |
| Effect of home language and literacy activities | | | | | |
| High frequency of classroom activities (i.e., every day) | −0.94 | 1.61 | 0.559 | −4.09 | 2.21 |
| Low frequency of classroom activities (i.e., 3–4 times a week) | 2.81 | 1.36 | **0.038** | 0.15 | 5.47 |
| *Outcome: Spanish literacy skills* | | | | | |
| Effect of classroom language and literacy activities | | | | | |
| High frequency of home activities (i.e., almost 5–7 days a week) | 1.09 | 1.76 | 0.535 | −2.36 | 4.55 |
| Low frequency of home activities (i.e., 1–2 times a week) | 6.73 | 2.15 | **0.002** | 2.52 | 10.93 |
| Effect of home language and literacy activities | | | | | |
| High frequency of classroom activities (i.e., every day) | 1.71 | 1.49 | 0.252 | −1.21 | 4.62 |
| Low frequency of classroom activities (i.e., 3–4 times a week) | 5.05 | 1.25 | **0.000** | 2.60 | 7.50 |

Bolded effects were significant at the $\alpha = 0.05$ level.

Similarly, home language and literacy activities had a greater effect on children's emergent literacy skills, when classroom language and literacy activities were less frequent. For children who engaged in all 8 types of language and literacy activities in the classroom everyday (i.e., 85$^{th}$ percentile or frequency of classroom activities = 6), the effect of home language and literacy activities was non-significant for English ($b = -0.94$, $SE = 1.61$, $p = 0.559$, 95% $CI = [-4.09, 2.21]$) and Spanish ($b = 1.71$, $SE = 1.49$, $p = 0.252$, 95% $CI = [-1.21, 4.62]$; see Table 3) literacy skills. However, for children who engaged in different types of language and literacy activities in the classroom only 3 to 4 times a week (i.e., 15$^{th}$ percentile or frequency of classroom activities = 5.05), home language and literacy activities significantly predicted their English ($b = 2.81$, $SE = 2.37$, $p = 0.038$, 95% $CI = [0.15, 5.47]$) and Spanish ($b = 5.05$, $SE = 1.25$, $p < 0.001$, 95% $CI = [2.60, 7.50]$; see Table 3) literacy skills. Together, these findings suggested that language and literacy activities in the home and classroom settings compensated one another in supporting children's emergent literacy development.

# Discussion

Children of MSFW families face many challenges in early development and are largely "invisible" in educational research. The current study examined the unique and interactive effects of home and classroom language and literacy activities on MSFW children's emergent literacy skills. Results showed that the frequencies of home and classroom language and literacy activities uniquely contributed to children's emergent literacy skills in Spanish, but not in English. Additionally, children's home and classroom experiences compensated one another. Language and literacy activities in one context were more beneficial for those children who experienced less frequent language and literacy activities in the other context.

## Home language and literacy activities and children's emergent literacy skills

Consistent with previous work (Farver et al., 2013), the frequency of home language and literacy activities uniquely predicted children's emergent literacy skills in Spanish, while controlling for demographic variables and children's classroom experiences. This finding shows the important role of MSFW parents in their children's emergent literacy development. Even though MSFW parents in our sample had relatively low levels of education (65% of the parents did not have a high school diploma), their engagement in language and literacy activities with the children showed a positive effect on children's emergent literacy skills in the home language. Indeed, almost 40% of the MSFW parents in our sample reported engaging their children in language and literacy activities 3 to 4 days a week or more frequently, indicating their high motivation and investment in promoting early language and literacy development (Purcell-Gates, 2013).

The frequency of home language and literacy activities did not uniquely predict children's emergent literacy skills in English. Most MSFW parents reported only or primarily using Spanish with their children. However, this finding does not necessarily mean that the effect of home language and literacy activities is language specific. On one hand, it might take children time to transfer their emergent literacy skills from one language to another, thus showing a delayed cross-language transfer effect. For example, a study found that home literacy activities at kindergarten, which primarily occurred in Spanish, predicted Latino children's concurrent emergent literacy skills in Spanish, which further predicted their reading skills in both Spanish and English in the 7$^{th}$ grade (Reese et al., 2000). On the other hand, the effect of home language and literacy activities on children's English emergent literacy skills seems to vary by

children's experiences in the classroom, which will be discussed later.

## Classroom language and literacy activities and children's emergent literacy skills

Overall, MSHS teachers reported frequently engaging children in language and literacy activities in the classroom. Classroom language and literacy activities uniquely predicted children's emergent literacy skills in Spanish, highlighting the supportive role of MSHS classroom in children's home language development. Most MSHS teachers used some Spanish during teaching and learning activities to accommodate the linguistic and cultural needs of MSFW children. Indeed, teachers' use of the home language of DLLs has been found to benefit children's home language growth (Collier and Thomas, 2004; Rolstad et al., 2005; Barnett et al., 2007; Figueras-Daniel and Li, 2021).

However, classroom activities did not uniquely predict children's English emergent literacy skills. This could not be simply explained by teachers' instructional language(s), as most teachers reported using both English and Spanish during classroom activities. Supplementary analyses examining the interaction between classroom language and literacy activities and teachers' instructional language(s) suggested that the effect of classroom activities did not vary by the language(s) teachers used ($p$'s > 0.05). One possible explanation is that MSHS teachers might be primarily focusing on supporting children's English language skills rather than their English literacy skills. Many MSHS children came to the program with very limited English proficiency (Stechuk and Burns, 2005) and might need to acquire adequate English language skills before they could develop emergent literacy skills in English. Additionally, children might be more engaged and interested in Spanish language and literacy activities, which are more relevant to their cultural and linguistic experiences at home and in the MSFW community (Purcell-Gates, 2013). Children's high level of engagement and interests in learning might further enhance their Spanish learning outcomes (Baroody and Diamond, 2016).

## The compensatory roles of home and classroom language and literacy activities

The effects of home and classroom language and literacy activities compensated one another. Specifically, frequent classroom language and literacy activities predicted children's Spanish emergent skills for those children who experienced infrequent language and literacy activities at home, but not for those who engaged in home activities 5–7 days a week. These findings were consistent with previous evidence that high-quality early education buffers against the negative effects of impoverished home experiences on children's language and cognitive outcomes (Magnuson et al., 2004; McCartney et al., 2007; Crosnoe et al., 2010; Vernon-Feagans et al., 2013, 2019). Theoretically, the unique and compensatory roles of home and classroom language and literacy activities support the notion of Mesosystem in the Bioecological Model (Bronfenbrenner and Morris, 2006), which maintains that children's immediate developmental contexts (e.g., family, school) can interact with one another and jointly impact developmental outcomes.

Likewise, home language and literacy activities benefited children's emergent literacy skills more when children had less frequent language and literacy activities in the classroom, highlighting the protective role of home language and literacy activities. When children experienced relatively low frequency of classroom activities, home language and literacy activities predicted children's emergent literacy skills in both Spanish and English. These findings suggested that language and literacy activities in the family context are crucial for MSFW children to develop their home language and may compensate the lack of language and literacy support in the classroom. More interestingly, even though most MSFW parents reported that they predominantly used Spanish with their children, the impact of home language and literacy activities could go beyond the home language to children's learning of English. Previous work with DLLs also showed that the frequency of family literacy activities in the heritage language predicted children's vocabulary growth in the societal language when children experienced low to average quality of language stimulation in the classroom (Willard et al., 2021).

## Practical implications

Findings of the study have practical implications for parents and teachers. First, enhancing language and literacy practices in MSFW households may be a valuable strategy to promote children's development of emergent literacy skills. MSFW parents often view school as the primary context for children to acquire English skills and consider themselves incapable of supporting children's English learning when cultural and language barriers prevent them from participating in school-related activities (Smith and Johnson, 2019). However, our study showed that home language and literacy activities were associated with children's emergent literacy skills in *both* English and Spanish, when the frequency of classroom activities was relatively low. Early intervention and prevention programs should encourage MSFW parents to frequently engage in language and literacy practices that are valuable and appropriate in their own cultural and linguistic contexts (Boyce et al., 2010; St. Clair et al., 2012), as well as empower them to recognize their critical role in supporting children's dual language development.

Additionally, our findings highlight the compensatory role of language and literacy rich MSHS classrooms for children

with limited language and literacy resources at home. It is important to promote teachers' engagement in classroom language and literacy activities via professional training (Solari et al., 2016). Notably, even though classroom is a primary context for English exposure, classroom language and literacy activities did not show a significant effect on children's English emergent literacy skills. More attention and resources are needed to help MSHS teachers develop effective teaching strategies to support DLLs' English acquisition (Zepeda et al., 2011). The multisystemic approach recognizes the importance of bridging the gap between the language and literacy practices in the home and school contexts (Barrueco, 2012). Teachers should understand and build upon the literacy knowledge MSFW children gain from their home and community and integrate culturally and linguistically relevant practices into classroom activities (Purcell-Gates, 2013). For instance, in an ethnographic study, compared to book-reading activities, MSFW children were more interested and engaged in culturally responsive activities such as making birthday cards, which they frequently experienced in the migrant farmworker camps (Purcell-Gates, 2013). Interventions should also consider facilitating children's home and classroom experiences simultaneously (Whitehurst et al., 1994; Grøver et al., 2020). For example, a study in Norway found that providing DLLs with the same set of books to read both in the classroom and at home improved children's early language and literacy skills in the societal language (Grøver et al., 2020).

### Limitations and future directions

The study has several limitations. First, we only focused on the frequency of language and literacy activities reported by parents and teachers. The adult self-report approach might result in an overestimation of children's engagement. Observational studies are needed to replicate our findings. Additionally, the study did not examine other types of activities frequently experienced by MSFW, such as reading letters from their extended families, writing a grocery shopping list (Purcell-Gates, 2013), as well as children's media exposure such as television watching and access to computers and electronic devices (e.g., smartphones). It is also possible that different learning activities contribute to early literacy development in unique ways, an area worth exploring in future research. Furthermore, other important aspects of children's experiences, such as the quality of language and literacy activities (Justice et al., 2018), the levels of children's engagement and interest during these activities (Baroody and Diamond, 2016), and the language(s) used during these activities, also play an important role and are worth examining in combination with the frequency of activities. Therefore, more observational work is needed in future research.

In addition to their family members and teachers, MSFW and/or Latino children constantly interact with and gain language and literacy skills from their extended families, peers, and members from the community (Gonzalez and Uhing, 2008; Purcell-Gates, 2013). Future studies should consider these culturally relevant experiences.

Finally, the current study was based on cross-sectional data, which requires us to consider various potential causal scenarios. Children not only learn from language and literacy activities but can also actively elicit language and literacy learning opportunities from their home and classroom environments. Children's language and literacy experiences might also change over time, as they gain more exposure to the U.S. school system, calling for a longitudinal approach. To date, there is a dearth of longitudinal studies with MSFW children, partially due to the high mobility of the MSFW families (Mathur and Parameswaran, 2012).

## Conclusion

Language and literacy activities in both the home and classroom contexts play an imperative role in MSFW children's emergent literacy skills. More importantly, frequent language and literacy activities in one context would be more beneficial when children engaged in these activities less frequently in the other context, showing a compensatory relation of the two contexts. Together, these findings can help parents, teachers, and education policy makers find ways to enhance MSFW children's emergent literacy development, better prepare them for school learning, and ultimately increase equity and equality in early childhood and long-term development.

## Data availability statement

The datasets (Migrant and Seasonal Head Start Study, United States, 2017–2018) for this study can be found here: https://www.icpsr.umich.edu/web/ICPSR/studies/37348. Requests to access these datasets should be directed to the ICPSR online request system.

## Ethics statement

This is a secondary data analysis of an existing dataset. In the original study, written informed consent was obtained from the participating parents, teachers, and children's legal guardians. The current study was approved by the Institutional Review Board at Rutgers University.

## Author contributions

RL contributed to conceptual framework, data analysis, and manuscript writing. LS contributed to conceptual framework and

manuscript editing. All authors contributed to the article and approved the submitted version.

## Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

## Publisher's note



## References

Altun, D., Tantekin Erden, F., and Snow, C. E. (2018). A multilevel analysis of home and classroom literacy environments in relation to preschoolers' early literacy development. *Psychol. Sch.* 55, 1098–1120. doi: 10.1002/pits.22153

Baker, S. K., Gersten, R., Haager, D., and Dingle, M. (2006). Teaching practice and the reading growth of first-grade English learners: validation of an observation instrument. *Elem. Sch. J.* 107, 199–220. doi: 10.1086/510655

Barnett, W. S., Yarosz, D. J., Thomas, J., Jung, K. H., and Blanco, D. (2007). Two-way and monolingual English immersion in preschool education: an experimental comparison. *Early Child. Res. Q.* 22, 277–293. doi: 10.1016/j.ecresq.2007.03.003

Baroody, A. E., and Diamond, K. E. (2016). Associations among preschool children's classroom literacy environment, interest and engagement in literacy activities, and early reading skills. *J. Early Child. Res.* 14, 146–162. doi: 10.1177/1476718X14529280

Barrueco, S. (2012). Linguistic, literacy, and socioemotional interventions for young children in migrant and seasonal farm worker families. In B. Wasik and HornB. Van (Eds.), *Handbook of Family Literacy*. New York, NY: Routledge.

Beltran, M. A. (2010). Exploring program quality factors that impact child services in migrant and seasonal head start programs. *Diss. Abstr. Int.* 71:2742.

Boyce, L. K., Innocenti, M. S., Roggman, L. A., Norman, V. K. J., and Ortiz, E. (2010). Telling stories and making books: evidence for an intervention to help parents in migrant head start families support their children's language and literacy. *Early Educ. Dev.* 21, 343–371. doi: 10.1080/10409281003631142

Bronfenbrenner, U., and Morris, P. (2006). The bioecological model of human development. In W. Damon and R. M. Lerner (Series Eds.) & R. M. Lerner (Eds) *Handbook of Child Psychology*: *1*. Theoretical models of human development (*6th ed*. New York: John Wiley.

Bryant, D. M., Burchinal, M., Lau, L. B., and Sparling, J. J. (1994). Family and classroom correlates of head start children's developmental outcomes. *Early Child. Res. Q.* 9, 289–309. doi: 10.1016/0885-2006(94)90011-6

Burchinal, M. R., Peisner-Feinberg, E., Bryant, D. M., and Clifford, R. (2000). Children's social and cognitive development and child-care quality: testing for differential associations related to poverty, gender, or ethnicity. *Appl. Dev. Sci.* 4, 149–165. doi: 10.1207/S1532480XADS0403_4

Bus, A. G., Van Ijzendoorn, M. H., and Pellegrini, A. D. (1995). Joint book reading makes for success in learning to read: a meta-analysis on intergenerational transmission of literacy. *Rev. Educ. Res.* 65, 1–21. doi: 10.3102/00346543065001001

Castro, D. C., Páez, M. M., Dickinson, D. K., and Frede, E. (2011). Promoting language and literacy in young dual language learners: research, practice, and policy. *Child Dev. Perspect.* 5, 15–21. doi: 10.1111/j.1750-8606.2010.00142.x

Caswell, L., Bumgarner, E., Barrueco, S., López, M., Wolf, A., and Layzer, C. (2019). *Migrant and Seasonal Head Start Study 2017: Data Tables, OPRE Report #2019–66*. Washington, DC: Office of Planning, Research, and Evaluation, Administration for Children and Families, U.S. Department of Health and Human Services.

Caswell, L., Bumgarner, E., Barrueco, S., López, M., Wolf, A., Layzer, C., et al. (2020). *Migrant and Seasonal Head Start Study, United States, 2017-2018*. Inter-university Consortium for Political and Social Research [distributor].

Christopher, C., and Farran, D. (2020). Academic gains in kindergarten related to eight classroom practices. *Early Child. Res. Q.* 53, 638–649. doi: 10.1016/j.ecresq.2020.07.001

Cirino, P. T., Pollard-Durodola, S. D., Foorman, B. R., Carlson, C. D., and Francis, D. J. (2007). Teacher characteristics, classroom instruction, and student literacy and language outcomes in bilingual kindergarteners. *Elem. Sch. J.* 107, 341–364. doi: 10.1086/516668

Collier, V. P., and Thomas, W. P. (2004). The astounding effectiveness of dual language education for all. *NABE J. Res. Practice* 2, 1–20.

Connor, C. M., Morrison, F. J., and Slominski, L. (2006). Preschool instruction and children's emergent literacy growth. *J. Educ. Psychol.* 98, 665–689. doi: 10.1037/0022-0663.98.4.665

Crosnoe, R., Leventhal, T., Wirth, R. J., Pierce, K. M., and Pianta, R. (2010). NICHD early child care research network (NICHD ECCRN): family socioeconomic status and consistent environmental stimulation in early childhood. *Child Dev.* 81, 972–987. doi: 10.1111/j.1467-8624.2010.01446.x

Early Childhood Learning and Knowledge Center (ECLKC). (2022). Migrant and seasonal head start collaboration office. Available at: https://eclkc.ohs.acf.hhs.gov/state-collaboration/article/migrant-seasonal-head-start-collaboration-office (Accessed August 9, 2022).

Ezell, H. K., Gonzales, M. D., and Randolph, E. (2000). Emergent literacy skills of migrant Mexican American preschoolers. *Commun. Disord. Q.* 21, 147–153. doi: 10.1177/152574010002100303

Farver, J. A. M., Xu, Y., Lonigan, C. J., and Eppe, S. (2013). The home literacy environment and Latino head start children's emergent literacy skills. *Dev. Psychol.* 49, 775–791. doi: 10.1037/a0028766

Figueras-Daniel, A., and Li, Z. (2021). Evidence of support for dual language learners in a study of bilingual staffing patterns using the classroom assessment of supports for emergent bilingual acquisition (CASEBA). *Early Child. Res. Q.* 54, 271–285. doi: 10.1016/j.ecresq.2020.09.011

Gersten, R., Baker, S. K., Haager, D., and Graves, A. W. (2005). Exploring the role of teacher quality in predicting reading outcomes for first-grade English learners: an observational study. *Remedial Spec. Educ.* 26, 197–206. doi: 10.1177/07419325050260040201

Gersten, R., and Geva, E. (2003). Teaching reading to early language learners. *Educ. Leadersh.* 60, 44–49.

Gonzalez, J. E., Acosta, S., Davis, H., Pollard-Durodola, S., Saenz, L., Soares, D., et al. (2017). Latino maternal literacy beliefs and practices mediating socioeconomic status and maternal education effects in predicting child receptive vocabulary. *Early Educ. Dev.* 28, 78–95. doi: 10.1080/10409289.2016.1185885

Gonzalez, J. E., and Uhing, B. M. (2008). Home literacy environments and young Hispanic children's English and Spanish oral language: a communality analysis. *J. Early Interv.* 30, 116–139. doi: 10.1177/1053815107313858

Graves, A. W., Gersten, R., and Haager, D. (2004). Literacy instruction in multiple-language first-grade classrooms: linking student outcomes to observed instructional practice. *Learn. Disabil. Res. Pract.* 19, 262–272. doi: 10.1111/j.1540-5826.2004.00111.x

Grøver, V., Rydland, V., Gustafsson, J. E., and Snow, C. E. (2020). Shared book reading in preschool supports bilingual children's second-language learning: a cluster-randomized trial. *Child Dev.* 91, 2192–2210. doi: 10.1111/cdev.13348

Guarino, C. M., Hamilton, L. S., Lockwood, J. R., and Rathbun, A. H. (2006). *Teacher Qualifications, Instructional Practices, and Reading and Mathematics Gains of Kindergartners (NCES 2006–021)*. Washington, DC: U.S. Department of Education, National Center for Educational Statistics.

Hammer, C. S., Hoff, E., Uchikoshi, Y., Gillanders, C., Castro, D. C., and Sandilos, L. E. (2014). The language and literacy development of young dual language learners: a critical review. *Early Child. Res. Q.* 29, 715–733. doi: 10.1016/j.ecresq.2014.05.008

Haney, M., and Hill, J. (2004). Relationships between parent-teaching activities and emergent literacy in preschool children. *Early Child Dev. Care* 174, 215–228. doi: 10.1080/0300443032000153543

Hood, M., Conlon, E., and Andrews, G. (2008). Preschool home literacy practices and children's literacy development: a longitudinal analysis. *J. Educ. Psychol.* 100, 252–271. doi: 10.1037/0022-0663.100.2.252

Inoue, T., Georgiou, G. K., Parrila, R., and Kirby, J. R. (2018). Examining an extended home literacy model: the mediating roles of emergent literacy skills and reading fluency. *Sci. Stud. Read.* 22, 273–288. doi: 10.1080/10888438.2018.1435663

Justice, L., Jiang, H., and Strasser, K. (2018). Linguistic environment of preschool classrooms: what dimensions support children's language growth? *Early Child. Res. Q.* 42, 79–92. doi: 10.1016/j.ecresq.2017.09.003

Justice, L. M., Mashburn, A. J., Hamre, B. K., and Pianta, R. C. (2008). Quality of language and literacy instruction in preschool classrooms serving at-risk pupils. *Early Child. Res. Q.* 23, 51–68. doi: 10.1016/j.ecresq.2007.09.004

Kupersmidt, J. B., and Martin, S. L. (1997). Mental health problems of children of migrant and seasonal farm workers: a pilot study. *J. Am. Acad. Child Adolesc. Psychiatry* 36, 224–232. doi: 10.1097/00004583-199702000-00013

Lonigan, C. J., Burgess, S. R., and Anthony, J. L. (2000). Development of emergent literacy and early reading skills in preschool children: evidence from a latent-variable longitudinal study. *Dev. Psychol.* 36, 596–613. doi: 10.1037/0012-1649.36.5.596

Luo, R., and Tamis-LeMonda, C. S. (2019). Preschool book-sharing and oral storytelling experiences in ethnically diverse, low-income families. *Early Child Dev. Care* 189, 1602–1619. doi: 10.1080/03004430.2017.1400542

Lynch, J. (2008). Engagement with print: low-income families and head start children. *J. Early Child. Lit.* 8, 151–175. doi: 10.1177/1468798408091853

Magnuson, K. A., Meyers, M. K., Ruhm, C. J., and Waldfogel, J. (2004). Inequality inpreschool education and school readiness. *Am. Educ. Res. J.* 41, 115–157. doi: 10.3102/00028312041001115

Mathur, S., and Parameswaran, G. (2012). School readiness for young migrant children: the challenge and the outlook. *Int. Scholar. Res. Notice.* 2012, 1–9. doi: 10.5402/2012/847502

McCartney, K., Dearing, E., Taylor, B. A., and Bub, K. L. (2007). Quality child care sup-ports the achievement of low-income children: direct and indirect pathways through caregiving and the home environment. *J. Appl. Dev. Psychol.* 28, 411–426. doi: 10.1016/j.appdev.2007.06.010

Mehta, K., Gabbard, S. M., Barrat, V., Lewis, M., Carroll, D., and Mines, R. (2000). Findings from the National Agricultural Workers Survey (NAWS), 1997-1998: a demographic and employment profile of United States farm workers. Available at: http://www.dol.gov/asp/programs/agworker/report_8.pdf (Accessed August 9, 2022).

Melhuish, E. C., Phan, M. B., Sylva, K., Sammons, P., Siraj-Blatchford, I., and Taggart, B. (2008). Effects of the home learning environment and preschool center experience upon literacy and numeracy development in early primary school. *J. Soc. Issues* 64, 95–114. doi: 10.1111/j.1540-4560.2008.00550.x

Mendive, S., Mascareño Lara, M., Aldoney, D., Pérez, J. C., and Pezoa, J. P. (2020). Home language and literacy environments and early literacy trajectories of low-socioeconomic status Chilean children. *Child Dev.* 91, 2042–2062. doi: 10.1111/cdev.13382

National Center for Farmworker Health (NCFH) (2020). Facts about agricultural workers. Available at: http://www.ncfh.org/facts-about-agricultural-workers-fact-sheet.html

Noble, C., Sala, G., Peter, M., Lingwood, J., Rowland, C., Gobet, F., et al. (2019). The impact of shared book reading on children's language skills: a meta-analysis. *Educ. Res. Rev.* 28:100290. doi: 10.1016/j.edurev.2019.100290

O'Brien, R., Barrueco, S., López, M. L., and D'Elio, M. A. (2011). *Design of the National Migrant and Seasonal Head Start Survey*. Washington, DC: Department of Health and Human Services.

Perreira, K. M., Chapman, M. V., and Stein, G. L. (2006). Becoming an American parent: overcoming challenges and finding strength in a new immigrant Latino community. *J. Fam. Issues* 27, 1383–1414. doi: 10.1177/0192513X06290041

Peterson, C., and McCabe, A. (1994). A social interactionist account of developing decontextualized narrative skill. *Dev. Psychol.* 30, 937–948. doi: 10.1037/0012-1649.30.6.937

Pianta, R. C., Whittaker, J. E., Vitiello, V., Ruzek, E., Ansari, A., and Hofkens, T. (et al., 2020). Children's school readiness skills across the pre-K year: associations with teacher-student interactions, teacher practices, and exposure to academic content. *J. Appl. Dev. Psychol.* 66:101084. doi: 10.1016/j.appdev.2019.101084

Piasta, S. B. (2016). Current understandings of what works to support the development of emergent literacy in early childhood classrooms. *Child Dev. Perspect.* 10, 234–239. doi: 10.1111/cdep.12188

Purcell-Gates, V. (2013). Literacy worlds of children of migrant farmworker communities participating in a migrant head start program. *Res. Teach. Engl.* 20, 68–97.

Raikes, H., Alexander Pan, B., Luze, G., Tamis-LeMonda, C. S., Brooks-Gunn, J., Constantine, J., et al. (2006). Mother–child bookreading in low-income families: correlates and outcomes during the first three years of life. *Child Dev.* 77, 924–953. doi: 10.1111/j.1467-8624.2006.00911.x

Reese, L., Garnier, H., Gallimore, R., and Goldenberg, C. (2000). Longitudinal analysis of the antecedents of emergent Spanish literacy and middle-school English reading achievement of Spanish-speaking students. *Am. Educ. Res. J.* 37, 633–662. doi: 10.3102/00028312037003633

Reese, E., Sparks, A., and Leyva, D. (2010). A review of parent interventions for preschool children's language and emergent literacy. *J. Early Child. Lit.* 10, 97–117. doi: 10.1177/1468798409356987

Rodriguez, E. T., and Tamis-LeMonda, C. S. (2011). Trajectories of the home learning environment across the first 5 years: associations with children's vocabulary and literacy skills at prekindergarten. *Child Dev.* 82, 1058–1075. doi: 10.1111/j.1467-8624.2011.01614.x

Rodriguez, E. T., Tamis-LeMonda, C. S., Spellmann, M. E., Pan, B. A., Raikes, H., Lugo-Gil, J., et al. (2009). The formative role of home literacy experiences across the first three years of life in children from low-income families. *J. Appl. Dev. Psychol.* 30, 677–694. doi: 10.1016/j.appdev.2009.01.003

Rolstad, K., Mahoney, K., and Glass, G. V. (2005). The big picture: a meta-analysis of program effectiveness research on English language learners. *Educ. Policy* 19, 572–594. doi: 10.1177/0895904805278067

Sawyer, B. E., Hammer, C. S., Cycyk, L. M., López, L., Blair, C., Sandilos, L., et al. (2016). Preschool teachers' language and literacy practices with dual language learners. *Biling. Res. J.* 39, 35–49. doi: 10.1080/15235882.2016.1138904

Sénéchal, M., and LeFevre, J. A. (2002). Parental involvement in the development of children's reading skill: a five-year longitudinal study. *Child Dev.* 73, 445–460. doi: 10.1111/1467-8624.00417

Sénéchal, M., and LeFevre, J. A. (2014). Continuity and change in the home literacy environment as predictors of growth in vocabulary and reading. *Child Dev.* 85, 1552–1568. doi: 10.1111/cdev.12222

Shen, Y., and Del Tufo, S. N. (2022). Parent-child shared book reading mediates the impact of socioeconomic status on heritage language learners' emergent literacy. *Early Child. Res. Q.* 59, 254–264. doi: 10.1016/j.ecresq.2021.12.003

Smith, J., and Johnson, D. J. (2019). Parental perspectives on education: Mexican and Mexican-American farmworker families with young children enrolled in migrant and seasonal head start. *J. Latinos Educ* 21, 388–403. doi: 10.1080/15348431.2019.1666010

Soderstrom, M., and Wittebolle, K. (2013). When do caregivers talk? The influences of activity and time of day on caregiver speech and child vocalizations in two childcare environments. *PLoS One* 8, 1–12. doi: 10.1371/journal.pone.0080646

Solari, E. J., Zucker, T. A., Landry, S. H., and Williams, J. M. (2016). Relative effects of a comprehensive versus reduced training for head start teachers who serve Spanish-speaking English learners. *Early Educ. Dev.* 27, 1060–1076. doi: 10.1080/10409289.2016.1158610

Song, L., Luo, R., and Liang, E. (2022). Dual language development of Chinese 3-and 4-year-olds: associations with the family context and teachers' language use. *Early Educ. Dev.* 33, 219–242. doi: 10.1080/10409289.2020.1865746

Sonnenschein, S., Stapleton, L. M., and Benson, A. (2010). The relation between the type and amount of instruction and growth in children's reading competencies. *Am. Educ. Res. J.* 47, 358–389. doi: 10.3102/0002831209349215

St. Clair, L., Jackson, B., and Zweiback, R. (2012). Six years later: effect of family involvement training on the language skills of children from migrant families. *Sch. Community J.* 22, 9–19.

Stata Corp. (2021). *Stata: Release 17. Statistical Software*. College Station, TX: Stata Corp LLC.

Stechuk, R. A., and Burns, M. S. (2005). *Making a Difference: A Framework for Supporting First and Second Language Development in Preschool Children of Migrant Farm Workers*. Washington, DC: Academy for Educational Development.

Tamis-LeMonda, C. S., Custode, S., Kuchirko, Y., Escobar, K., and Lo, T. (2018). Routine language: speech directed to infants during home activities. *Child Dev.* 90, 2135–2152. doi: 10.1111/cdev.13089

Tamis-LeMonda, C. S., Luo, R., McFadden, K. E., Bandel, E. T., and Vallotton, C. (2019). Early home learning environment predicts children's 5th grade academic skills. *Appl. Dev. Sci.* 23, 153–169. doi: 10.1080/10888691.2017.1345634

Tavassolie, T., López, C., De Feyter, J., Hartman, S. C., and Winsler, A. (2018). Migrant preschool children's school readiness and early elementary school performance. *J. Educ. Res.* 111, 331–344. doi: 10.1080/00220671.2016.1261074

Taylor, Z. E., and Ruiz, Y. (2017). Contextual stressors and the mental health outcomes of Latino children in rural migrant-farmworker families in the Midwest. *J. Rural Ment. Health* 41, 284–298. doi: 10.1037/rmh0000082

van der Pluijim, M., van Gelderen, A., and Kessels, J. (2019). Activities and strategies for parents with less education to promote the oral language development of their children: a review of empirical interventions. *Sch. Community J.* 29, 317–362.

Vernon-Feagans, L., and Bratsch-Hines, M. E.Family Life Project Key Investigators (2013). Caregiver–child verbal interactions in child care: a buffer against poor language outcomes when maternal language input is less. *Early Child. Res. Q.* 28, 858–873. doi: 10.1016/j.ecresq.2013.08.002

Vernon-Feagans, L., Mokrova, I. L., Carr, R. C., Garrett-Peters, P. T., and Burchinal, M. R.Family Life Project Key Investigators (2019). Cumulative years of classroom quality from kindergarten to third grade: prediction to children's third grade literacy skills. *Early Child. Res. Q.* 47, 531–540. doi: 10.1016/j.ecresq.2018.06.005

Votruba-Drzal, E., Coley, R. L., and Chase-Lansdale, P. L. (2004). Child care quality and low-income children's development: for who is child care most important? *Child Dev.* 75, 296–312. doi: 10.1111/j.1467-8624.2004.00670.x

Vygotsky, L. (1978). Interaction between learning and development. *Read. Dev. Child.* 23, 34–41.

White, L. J., Fernandez, V. A., and Greenfield, D. B. (2020). Assessing classroom quality for Latino dual language learners in head start: DLL-specific and general teacher-child interaction perspectives. *Early Educ. Dev.* 31, 599–627. doi: 10.1080/10409289.2019.1680785

Whitehurst, G. J., Arnold, D. S., Epstein, J. N., Angell, A. L., Smith, M., and Fischel, J. E. (1994). A picture book reading intervention in day care and home for children from low-income families. *Dev. Psychol.* 30, 679–689. doi: 10.1037/0012-1649.30.5.679

Willard, J. A., Kohl, K., Bihler, L. M., Agache, A., and Leyendecker, B. (2021). Family literacy activities and their interplay with family and preschool language environments: links to gains in dual language learners' German vocabulary. *Early Educ. Dev.* 32, 189–208. doi: 10.1080/10409289.2020.1744404

Woodcock, R. W., Muñoz-Sandoval, A. F., Ruef, M., and Alvarado, C. G. (2005). *Woodcock-Muñoz Language Survey, Revised Normative Update*. Rolling Meadows, IL: Riverside.

Xue, Y., and Meisels, S. J. (2004). Early literacy instruction and learning in kindergarten: evidence from the early childhood longitudinal study—kindergarten class of 1998–1999. *Am. Educ. Res. J.* 41, 191–229. doi: 10.3102/00028312041001191

Zepeda, M., Castro, D. C., and Cronin, S. (2011). Preparing early childhood teachers to work with young dual language learners. *Child Dev. Perspect.* 5, 10–14. doi: 10.1111/j.1750-8606.2010.00141.x

Zucker, T. A., Cabell, S. Q., Justice, L. M., Pentimonti, J. M., and Kaderavek, J. N. (2013). The role of frequent, interactive prekindergarten shared reading in the longitudinal development of language and literacy skills. *Dev. Psychol.* 49, 1425–1439. doi: 10.1037/a0030347

frontiers | Frontiers in Communication

TYPE Original Research
PUBLISHED 15 December 2022
DOI 10.3389/fcomm.2022.1059427



OPEN ACCESS

EDITED BY
Natalia Meir,
Bar-Ilan University, Israel

REVIEWED BY
Natalia Banasik-Jemielniak,
The Maria Grzegorzewska University, Poland
Maureen Scheidnes,
Memorial University of Newfoundland, Canada

*CORRESPONDENCE
Elma Blom
w.b.t.blom@uu.nl

SPECIALTY SECTION
This article was submitted to Language Sciences, a section of the journal Frontiers in Communication

RECEIVED 01 October 2022
ACCEPTED 16 November 2022
PUBLISHED 15 December 2022

CITATION
Blom E, Boerma T, Karaca F, de Jong J and Küntay AC (2022) Grammatical development in both languages of bilingual Turkish-Dutch children with and without Developmental Language Disorder. *Front. Commun.* 7:1059427. doi: 10.3389/fcomm.2022.1059427



# Grammatical development in both languages of bilingual Turkish-Dutch children with and without Developmental Language Disorder

Elma Blom[1,2]*, Tessel Boerma[3], Figen Karaca[4], Jan de Jong[5] and Aylin C. Küntay[6]

[1]Department of Education and Pedagogy, Utrecht University, Utrecht, Netherlands, [2]Department of Language and Culture, The Arctic University of Norway UiT, Tromsø, Norway, [3]Department of Literature, Languages, and Communication, Utrecht University, Utrecht, Netherlands, [4]Center for Language Studies, Radboud University, Nijmegen, Netherlands, [5]Department of Biological and Medical Psychology, University of Bergen, Bergen, Norway, [6]College of Social Sciences and Humanities, Koç University, Istanbul, Turkey

**Introduction:** To guarantee a reliable diagnosis of Developmental Language Disorder (DLD) in bilingual children, evaluating both languages is recommended. However, little is known about how DLD impacts the heritage language, and it is largely unknown whether bilingual children with DLD develop the heritage language at the same pace as their peers with typical development (TD).

**Methods:** For this longitudinal study that focused on children's grammatical development, we analyzed semi-spontaneous speech samples of 10 Turkish-Dutch children with DLD (bi-DLD) and 10 Turkish-Dutch children with typical development (bi-TD). Children were 5 or 6 years old at the first wave of data collection, and there were three waves of longitudinal data collection with 1-year intervals. In addition, data from 20 monolingual Dutch controls were analyzed (10 mono-DLD, 10 mono-TD).

**Results and discussion:** Results indicate that heritage language assessment can inform clinical diagnosis. In the case of Turkish spoken in the Netherlands, short sentences, the absence of the genitive suffix in simple constructions and avoidance of complex constructions that require possessive marking could potentially be clinical markers of DLD. Accusative case errors are also relatively frequent in bilingual Turkish-Dutch children with DLD, but these are less promising as a clinical marker because previous research suggests that omission and substitution of accusative case can be part of the input to Turkish heritage language learners. In Dutch, frequent omission of grammatical morphemes in the verbal domain coupled with a limited amount of overregularization errors could indicate that a child is at risk for DLD, both in bilingual and monolingual contexts. Cross-linguistic comparisons of error types in Turkish and Dutch confirm that, regardless of typological differences, children with DLD use short sentences, avoid complex structures, and omit grammatical morphemes. Longitudinal analyses revealed that children with DLD can develop the heritage language at the same pace as TD children,

even if this language is not supported at school. Strong intergenerational transmission and heritage language maintenance among Turkish migrants in the Netherlands may be key.

KEYWORDS

language impairment, bilingualism, heritage language, grammatical morphemes, cross-linguistic comparison, longitudinal design, error types, clinical markers

## Introduction

Developmental Language Disorder (DLD) is a congenital disorder that affects ∼5–7% of the children (Tomblin et al., 1997; Norbury et al., 2016).[1] Symptoms include a delayed onset of language development (Rice, 2013), and persistent difficulties in learning language, specifically grammar (Leonard, 2014). While most international research to date is concerned with DLD in monolingual children, it is generally believed that, worldwide, monolinguals are outnumbered by children learning more than one language (Bialystok et al., 2012). Consequently, the numbers of bilingual children on clinical caseloads are large. Bilingual children face the risk of misdiagnosis because appropriate instruments for assessing language proficiency in a bilingual context are lacking (Mennen and Stansfield, 2006; Kohnert, 2010). To guarantee a reliable diagnosis of DLD, assessment in both languages is recommended (American Speech-Language-Hearing Association, 2022).

To inform clinical practice as well as research on bilingual assessment, the current study investigated both languages of children with DLD who learn Turkish as a heritage language and Dutch as a societal language. DLD in Dutch has featured prominently in research, and there is a growing body of research on heritage Turkish. However, little is known about how DLD impacts heritage Turkish, and it is unknown if bilingual children with DLD develop heritage Turkish at the same pace as their peers with typical development (TD). In this longitudinal study, we investigated children's simultaneous grammatical development over the course of a 2-year period, to determine how DLD impacts both Turkish and Dutch development. Our primary aim was to establish how DLD impacts grammatical development in both languages and, specifically, their errors with grammatical morphemes. Secondarily, grammatical morpheme errors in Dutch of bilingual children with DLD were compared with monolingual Dutch control data to establish reliable and robust clinical markers for Dutch that are relevant in bilingual and monolingual contexts.

## Language status and DLD

Heritage language learners are exposed to the language of the country that their parents or grandparents migrated from Valdés (2000). This language, that they inherit from their family, is "decisively not the language of the greater society" (Cabo, 2012; p. 451). It is confined to informal domains, such as use with family and friends, in contrast to the omnipresent societal language, which is used in informal and formal domains, such as work and education. Studies have shown that the societal language will inevitably become children's dominant language. Heritage language development is slower (Hoff, 2018), may come to a halt, may show signs of attrition (Montrul, 2008), or will not be used anymore by children. These effects are stronger in families where both parents speak the societal language (De Houwer, 2007) or when the heritage language does not receive systematic support at school (Restrepo et al., 2010).

With respect to Turkish in the Netherlands, recent research has indicated that children's Turkish development is under pressure (Akoğlu and Yağmur, 2016; Backus and Yağmur, 2017), despite strong intergenerational transmission of Turkish (Extra and Yağmur, 2010). Children's less proficient development in Turkish could be related to linguistic norms imposed by schools in the Netherlands. Dutch schools are not very welcoming to the language and culture of minority groups, and instruction in minority or heritage languages in public schools has been discontinued in 2004 (Kuiken and Van der Linden, 2013). That spending time in Dutch-speaking schools has a negative impact on children's Turkish development is supported by questionnaire data, showing that Turkish is often reported as children's dominant language at age 4–5 years while this shifts to Dutch from age 8–9 years (Extra et al., 2002). Results from a longitudinal study, in which children's vocabulary in Turkish

1 These often-cited prevalence data are based on English-speaking population samples. The current study is focused on bilingual Turkish-Dutch children in the Netherlands. Regarding DLD prevalence among Turkish-speaking children, Topbaş et al. (2019) estimate 5% prevalence in Turkey. Regarding DLD prevalence among Dutch-speaking children, it is relevant to note that there is no national registration of children with DLD in the Netherlands. Reep-van den Bergh et al. (1998) report prevalence data ranging from 2% to >20% in the Netherlands. This wide range is related to the use of different instruments, cutoff scores, and classification criteria.

and Dutch was measured, are in line with these survey data (Blom et al., 2014a). Blom et al. (2014a) showed that at age 5 years (i.e., after spending about 1 year in Dutch kindergarten), 40% of the Turkish-Dutch children obtained higher vocabulary scores in Turkish than Dutch, while 1 year later this percentage had dropped to 11%. These findings are, however, not in line with a cross-sectional study investigating a group of bilingual Turkish-Dutch children using a range of measures for Turkish and Dutch language proficiency (Verhoeven et al., 2012). Verhoeven et al. (2012) conclude that skills in both languages kept on growing. Children in all age groups (6–7 years, 8–9 years, 10–11 years) had, on average, higher scores in Turkish compared to Dutch. Interaction effects showed that the difference between Turkish and Dutch became smaller with age for phoneme discrimination and reproduction, and story comprehension. These findings suggest that, for most children, Turkish remained their dominant language throughout primary education. This seems hard to reconcile with the conclusion that heritage Turkish is under pressure, although the cross-sectional design of the study conducted by Verhoeven et al. (2012) limits conclusions about development.

The study of Verhoeven et al. included children with TD and DLD. In their study, no indications were found that heritage language development was different across the two groups, which contrasts with observations reported by Restrepo and Kruth (2000), who compared two 7-year-old bilingual Spanish-English girls with and without DLD with similar time of exposure to English (the societal language). Their findings suggest that the child with DLD showed more rapid loss of heritage Spanish, in line with the hypothesis that effects of limited input in and use of the heritage language could be amplified in the context of DLD (Blom et al., 2019). The reason for this amplifying effect is that children with DLD are found to have difficulties processing language input (Gillam et al., 2019), as evidenced in studies which show that children with DLD need more input than their peers with TD to reach the same language level (Rice et al., 1992; Gray, 2003; Weismer et al., 2013; MacRoy-Higgins and Dalton, 2015). Conceivably, input processing limitations, particularly when coupled with limited language input and use, will not only slow down language development but could also lead to faster erosion of the heritage language because the linguistic representations of children with DLD are less ingrained, less stable, and less robust than those of their TD peers.

In sum, although bilingual assessment is recommended, it is largely unknown whether and how bilingual assessment can contribute to a reliable diagnosis of DLD in the context of heritage language learners. In children with DLD, language skills in Turkish and Dutch will both be weak, and lower levels of input and use may disproportionally affect Turkish learned as a heritage language. However, Turkish may also be weakly developed in TD children, due to its status as heritage language, limiting the diagnostic potential. In that case, the status of the heritage language and the presence of DLD would create a confound. Research into the heritage language development of children with DLD as well as comparisons with their TD peers are needed to establish the potential contribution of heritage language assessment to a reliable diagnosis of DLD.

## Language typology and DLD

In addition to language status, language typology is a factor which influences the way in which DLD impacts language development, particularly in the types of error children make (Leonard, 2014). For example, in Germanic languages, like Dutch and German, correct use of finite verbs poses a problem for children with DLD (Clahsen et al., 1997; Rice et al., 1997; de Jong, 1999; Wexler et al., 2004). In languages with extensive case systems, such as Hungarian or Finnish, case errors are frequent (Lukács et al., 2010; Leonard et al., 2014). In terms of grammatical morpheme production, children with DLD tend to frequently omit grammatical morphemes in Germanic languages (Rice and Wexler, 1996; Blom et al., 2014b), while making few overregularization errors (e.g., *go–goed*) (monolinguals: Oetting and Horohov, 1997; Redmond and Rice, 2001; Van der Lely and Ullman, 2001; bilinguals: Blom and Paradis, 2013). In morphologically rich languages, such as Hebrew or Hungarian, children with DLD substitute grammatical morphemes rather than omitting them (Dromi et al., 1999; Lukács et al., 2009). In these languages, if multiple features need to be encoded in an inflectional sequence, they tend to produce all but one feature correctly (Leonard, 2014), or substitute a form that carries more grammatical features with one that has fewer features (Dromi et al., 1999). As Turkish and Dutch differ strongly in the expression of case and in richness of morphology, it is expected that DLD in Turkish and Dutch is characterized by different types of grammatical morpheme errors. Below, we briefly describe some basic properties of Turkish (based on Kornfilt, 1997; Göksel and Kerslake, 2005; Topbaş and Yavas, 2010) and Dutch (based on Haeseryn et al., 1997; Booij, 2002), as well as characteristics of DLD in both languages.

### Turkish

Turkish is an agglutinative language, meaning that a root can be followed by multiple morphemes. Derivational morphemes are closest to the root. The sequence of nominal inflections, which follows derivational morphemes, starts with plural, followed by agreement markers that express person and number of the possessor, and, lastly, case, as illustrated in (1).

(1) Kitap-lar-ın-da
book-PL-2POSS-LOC
"in your books."

Nominative case is not marked overtly, while accusative case is used with definite objects only and not if the object is indefinite. Other cases are genitive, dative, locative, ablative and instrumental case. The sequence of verbal inflections is: voice (reciprocal, passive, causative), negation, mood (desiderative, necessitative, optative, possibility), tense (progressive, future, present/aorist, definite past, narrative past), and agreement, as illustrated in (2). Agreement in the nominal and verbal domain expresses person (1, 2, 3) and number (singular, plural). Third person singular verb agreement is not expressed overtly, and there is no gender agreement. Syntactically, the basic word order in Turkish is Subject-Object-Verb. As argument structure is reflected in case marking, word order variations are allowed, but these are typically associated with pragmatic and semantic distinctions.

(2) Gör-üş-me-yebil-ir-di-k
see-RECIP-NEG-POSSIBILITY-AOR-PST-1PL
"we could have not met."

With respect to grammatical errors made by Turkish children with DLD, available research has focused on the word-level (morphology) rather than the sentence-level (syntax), which is not surprising given the agglutinative character of Turkish and its relatively free word order. Exploratory studies of Acarlar and Johnston (2006, 2011) with children with general developmental delays whose spontaneous speech was analyzed show that nominal morphology is more vulnerable than verbal morphology. Specifically, case marking and genitive-possessive constructions where the possessor bears the genitive case and the possessee an agreement marker, like *evi* in (3), were found to be problematic.

(3) Bir kız-ın evi
A-INDEF girl-GEN house-3PS.POSS
"a girl's house."

Genitive-possessive constructions may also be used in complex sentence structures in Turkish. In certain types of embedded clauses, the finite sentence form is not preserved. The verb of the embedded clause is nominalized (VN) and marked with a possessive suffix while its subject is marked with genitive case, forming a genitive-possessive construction, as in (4). Case markers may, then, be attached to the whole embedded clause (American Speech-Language-Hearing Association, 2022). Such complex use of genitive case was argued to be a potential explanation for genitive case errors of Turkish children with atypical language development (Acarlar and Johnston, 2011).

(4) Sen-in kazan-acağ-ın-ı düşün-üyor-um.
You-GEN win-VN(future)-2SG.POSS-ACC think-PROG-1SG
"I think that you will win."

More recent studies indicate that both noun and verb morphology are affected in Turkish children with DLD (Topbaş et al., 2016; Güven and Leonard, 2020, 2021). Güven and Leonard (2020, 2021) examined noun and verb morphology in spontaneous speech samples of 40 children with DLD between ages 4 and 7 years. Children with DLD were less accurate than age-matched and younger TD children on noun as well as verb morphology. The most frequent noun morphology error was the use of unmarked nominative case in contexts that required an overt suffix. The children with DLD had more difficulties using nouns with more than one suffix than the TD children did and tended to preserve the suffix closest to the stem (plural) while dropping more distant suffixes. Verb morphology errors were mostly incorrect bare stems, omitted suffixes, and substituted suffixes. Verbs requiring fewer suffixes were used with greater accuracy than verbs requiring more suffixes, indicating that length was an important factor. Errors in non-transparent irregular verbs were moreover relatively frequent (Güven and Leonard, 2021).

Two studies investigated children with DLD who learned Turkish as a heritage language. In their research with 20 bilingual Turkish-Dutch children with DLD, de Jong et al. (2010) observed more errors in the nominal than the verbal domain. Data in this study were collected with a sentence completion task, supplemented with data collected using a narrative task (Frog story). Studying spontaneous speech samples of two Turkish-German children with DLD, Rothweiler et al. (2010) found high accuracy in case marking, although the children with DLD produced more errors (15%) than three Turkish-German TD children (5.6%). Specifically, substitutions of accusative case for dative case distinguished DLD from TD, although such errors were found in only one of two children with DLD. The errors of the other child with DLD were limited to omission errors. Importantly, in the context of the Netherlands, children's errors with accusative case may reflect properties of their input: in Turkish multiword expressions, accusative case can be omitted or substituted under the influence of Dutch which has no case marking for the direct object (Doğruöz and Backus, 2009). Furthermore, the genitive-possessive construction [see (3)] is not frequently used by heritage speakers of Turkish or is prone to errors (drop of the genitive marker) (Boeschoten, 1990), which is reflected in child data collected in the Netherlands (de Jong et al., 2010) and Germany (Rothweiler et al., 2010).

## Dutch

Dutch is a fusional language with sparse inflectional morphology, which is mostly concentrated around verbs. Finite verbs are marked for agreement (person, number) and tense. In the present tense singular, bare verb stems are used in first person context whereas second and third person are marked with a suffix (-t). In present tense plural and past tense contexts, number is expressed, and no person distinction is made. Non-finite verbs are selected by modal or tense

auxiliaries, and formed with an-en suffix (infinitives, e.g., *dans-en* "to dance") or circumfix (past participles, e.g., *ge-dans-t* "danced"). Nominal inflection is limited. Nouns can carry diminutive and number suffixes. Dutch has a hybrid gender system, distinguishing between common and neuter in the nominal system and distinguishing feminine, masculine and neuter in the pronominal system. Definite determiners are marked for gender (*de* and *het* "the" mark common and neuter gender, respectively), while the indefinite determiner (*een* "a") is unmarked for gender. Attributive adjectives are typically inflected with a schwa (groen-*ə*), as in (5), unless the adjective appears in an indefinite phrase and modifies a singular neuter noun (6):

(5) Het groene dak
The-DEF.SG.NEUT green roof
"the green roof."

(6) Een groen dak
A-INDEF.SG green roof
"a green roof."

Syntactically, Dutch has a basic Subject-Object-Verb (SOV) word order with Verb Second in main clauses, resulting in placement of finite verbs in second position and inversion of subject and verb when a non-subject occupies the first position in a sentence. Non-finite verbs are placed in the sentence-final position.

Previous research has identified the verbal domain as the locus of errors in Dutch children with DLD (de Jong, 1999; Rispens and De Bree, 2014). One error that has received much attention in research on monolingual Dutch children with DLD are "root" or "optional" infinitives, i.e., utterances with an infinitive that lack a finite verb (Wexler et al., 2004). Children with DLD also omit finite suffixes, resulting in incorrect bare verb stems which are placed in finite (second) position in the sentence (Blom et al., 2014b). One study on bilingual children suggested that incorrect bare stems could be a clinical marker (Verhoeven et al., 2011), that is, a linguistic form or principle that is characteristic of children with DLD and that enables identification of the disorder (Rice and Wexler, 1996). Another study indicated that there is not one specific error that is typical for (bilingual) DLD (Blom et al., 2013). In the nominal domain, both monolingual and bilingual children with DLD drop determiners, substitute the neuter gender definite determiner *het* or neuter gender demonstratives *dat/dit* with the common gender definite determiner *de* or common gender demonstratives *die/deze*, respectively, and use inflected adjectives instead of unmarked adjectives (in (6) that would imply substitution of *groene* for *groen*) (Orgassa and Weerman, 2008; Blom et al., 2015; Marinis et al., 2017). However, gender marking is acquired relatively late in Dutch (Cornips and Hulk, 2008). Moreover, in Dutch ethnolects, gender marking is variable (Hinskens et al., 2021), reducing its potential as a clinical marker. Investigating noun plural and past participle morphology, Boerma, et al. (2017) conclude that the omission of participial affixes is characteristic of DLD in monolingual and bilingual contexts. Noun plural production did not adequately differentiate DLD from TD groups. On the sentence level, word order errors and omissions of obligatory argument structure elements are found (Bol and Kuiken, 1988; de Jong, 1999; Zwitserlood et al., 2015), but these findings are solely based on research with monolinguals.

In sum, while several studies have investigated the grammatical development of children with DLD in Dutch, research on DLD in heritage Turkish is limited. To obtain more clarity and inform clinical practice, a broad overview of different grammatical morpheme errors of bilingual Turkish-Dutch children in both languages is needed, because typological differences between the two languages will impact the error patterns. Furthermore, to establish reliable and robust clinical markers, DLD status is relevant, regardless of bilingualism and developmental changes. That is, linguistic structures with which monolingual and bilingual children with DLD make persistently more errors than their TD peers may help to identify DLD.

## Present study

For the present study, we analyzed transcribed recordings of semi-naturalistic productions of Turkish and Dutch. Data in both languages of 10 bilingual children with DLD were compared with those of 10 bilinguals with TD to determine the effects of DLD on children's simultaneous grammatical development in the heritage language (Turkish) and the societal language (Dutch). For Dutch, available control data of 20 monolingual children, equally divided over DLD and TD groups, were analyzed to determine whether between-group differences are dependent on bilingualism. From each child, data were collected three times with 1-year intervals, allowing for longitudinal analyses that provide insight into the pace of grammatical development. This study focused primarily on grammatical morphemes, but because so little is known about DLD in the context of heritage language development, we also investigated grammatical development more broadly at the sentence-level. Three main research questions guided the study.

### Research question 1: Effects of DLD on the heritage language (Turkish)

a. Does grammatical development in Turkish differ between bilingual Turkish-Dutch children with and without DLD?
b. Do the types of errors with grammatical morphemes in Turkish differ between bilingual Turkish-Dutch children with and without DLD?

Across languages, DLD has a persistent effect on children's grammatical development. Longitudinal research with monolingual children suggests that while the onset of development of children with DLD is delayed, they develop at the same rate as TD children (Rice, 2013). We therefore expected that bilingual children with DLD would produce shorter utterances in Turkish and that they would make more grammatical errors than bilingual children with TD throughout the course of the study. However, if DLD interacts with levels of language input and use, it could have a disproportional effect on heritage language development (Restrepo and Kruth, 2000; Blom et al., 2019), as input and use in the heritage language may be limited. This yields the expectation that Turkish language skills of TD children may develop at a faster pace than those of children with DLD (i.e., longer sentences and fewer errors over time) because of low levels of input in Turkish.

Regarding the types of errors, we expected that children with DLD and TD would make a variety of errors, but that children with DLD would make more errors (Güven and Leonard, 2020, 2021). Grammatical morpheme errors could occur in the nominal and verbal domain (Güven and Leonard, 2020, 2021). We expected that case errors and errors with genitive-possessive constructions would be frequent (Acarlar and Johnston, 2006, 2011; Rothweiler et al., 2010; Güven and Leonard, 2020). Because of this, it is possible that grammatical morpheme errors in the nominal domain are more frequent than grammatical morpheme errors in the verbal domain (Acarlar and Johnston, 2006; de Jong et al., 2010). Further, in children with DLD, omissions could be more frequent than substitutions (Güven and Leonard, 2020), although case substitutions could occur as well (Rothweiler et al., 2010).

### Research question 2: Effects of DLD on the societal language (Dutch)

a. Does grammatical development in Dutch differ between bilingual Turkish-Dutch children with and without DLD?
b. Do the types of errors with grammatical morphemes in Dutch differ between bilingual Turkish-Dutch children with and without DLD?

We expected that bilingual children with DLD would produce shorter utterances in Dutch, and that they would make more grammatical errors than bilingual TD children. Furthermore, in Dutch, DLD and TD groups may be more likely to develop at the same pace than in Turkish, presuming that input levels in Dutch are relatively high due to schooling in Dutch.

Several studies have shown that children with DLD who are learning Dutch tend to make errors with grammatical morphemes in the verbal domain, and omit finite morphology (de Jong, 1999; Wexler et al., 2004; Verhoeven et al., 2011; Blom et al., 2013, 2014b) and participial affixes (Boerma, 2017). Regarding types of errors, we expected that these errors would also be more frequent in bilingual children with DLD compared to their TD peers. Overregularization, in contrast, may be infrequent in Dutch-speaking children with DLD, similar to what has been found for English (Oetting and Horohov, 1997; Redmond and Rice, 2001; Van der Lely and Ullman, 2001; Blom and Paradis, 2013), which is, like Dutch, a western Germanic language and typologically similar.

### Research question 3: Comparisons with monolinguals in the societal language (Dutch)

a. Are the grammatical morpheme errors found for monolingual Dutch children with DLD similar to those found for the bilingual Turkish-Dutch children with DLD?

Reliable clinical markers must be independent of whether a child is exposed to one or more languages. To establish whether grammatical morpheme production in Dutch can be a reliable clinical marker, we compared the types of grammatical morpheme errors of bilinguals (RQ2) with that of monolinguals. Assuming that children's errors with grammatical morphemes are more impacted by DLD than by bilingualism (Blom and Boerma, 2016; Boerma, et al., 2017), we expected that similar patterns would emerge in DLD-TD comparisons in monolinguals and bilinguals. This comparison focused on Dutch because monolingual Turkish control data were not available, and because our study concerned bilingual Turkish-Dutch children growing up in the Netherlands.

## Methods

### Participants

The data analyzed for the purpose of this study were collected within a larger longitudinal project on the interaction of bilingualism and DLD (see Boerma, 2017). The bilingual DLD sample included 10 bilingual Turkish-Dutch children. From a larger database, this core group of 10 Turkish-Dutch children with DLD (bi-DLD) was matched on a subject-by-subject basis with 10 Turkish-Dutch children with TD (bi-TD), 10 monolingual Dutch children with DLD (mo-DLD), and 10 monolingual Dutch children with TD (mo-TD). For each bi-DLD child, we tried to find the closest match in terms of chronological age (established at wave 1) and nonverbal intelligence (NVIQ; measured with the Wechsler Nonverbal-NL at wave 1) in the other three groups. In the two bilingual groups, Dutch input before age 4 years and Dutch input at home at wave 1 were also included in the matching procedure as criteria. This information was gathered with the Parents of Bilingual Children Questionnaire (PaBiQ; Tuller, 2015). Table 1 summarizes the demographic characteristics of the four matched groups, also including information on sex and socioeconomic status (SES) which were not prioritized during the matching procedure. Individual data

TABLE 1 Demographic characteristics of the four matched groups.

| | Age Mean (SD) | NVIQ Mean (SD) | Sex Number of girls | SES Median |
|---|---|---|---|---|
| bi-DLD ($n = 10$) | 69.70 (8.34) | 88.90 (11.21) | 2 | 5 |
| bi-TD ($n = 10$) | 71.10 (6.97) | 93.90 (7.31) | 5 | 3 |
| mo-DLD ($n = 10$) | 70.30 (6.60) | 91.40 (10.83) | 3 | 5 |
| mo-TD ($n = 10$) | 70.90 (6.81) | 93.60 (9.51) | 3 | 6 |

NVIQ is a quotient score with a mean of 100 and standard deviation of 15; SES was the average level of education of both caregivers measured on a 9-point scale; in the bi-TD group, SES information was available for nine children.

about the subject-by-subject matching can be found in the Supplementary material.

All children with DLD were recruited through two national organizations that provide education and care for children with language difficulties (Royal Auris Group, Royal Dutch Kentalis). They were diagnosed with DLD by a certified speech-language pathologist using official national guidelines (Stichting Siméa, 2014), which meant that they either (1) performed below 2 SD overall on a standardized test battery or (2) below 1.5 SD on two out of four subscales. Moreover, their nonverbal intelligence was 70 or above. We certified the latter for all children at wave 1 of the current study. In addition, their scores on a sentence repetition task (TAK Zinsvorming, part of the *Taaltoets Alle Kinderen*; Verhoeven and Vermeer, 2001) that was administered as part of our research, pointed to language difficulties. The TAK has norms for Dutch monolingual and bilingual children. Based on their scores, monolingual children are assigned to one of five level groups, where A is the highest level corresponding to the 25% highest scoring monolingual children in the population and E the lowest level corresponding to the 10% lowest scoring monolingual children. For comparisons with bilingual level groups, bilingual children are assigned to one of three level groups based on the performance of a bilingual norm group: low (1SD below the mean, corresponding to the 16$^{th}$ percentile or below), average (around the mean) or high (1SD above the mean, corresponding to the 84$^{th}$ percentile or above). All bi-DLD children scored in the low-level group for bilinguals. In the bi-TD group, 4 children scored in the low-level group, 3 in the average level group and 3 in the high-level group. Out of the 10 mo-DLD children, 8 scored within the 10$^{th}$ percentile (E), 1 in the 25$^{th}$ percentile (D), and 1 in the 50$^{th}$ percentile (C). Out of the 10 Mo-TD children, no child scored in the 10$^{th}$ percentile, and 1 in the 25$^{th}$ percentile (D); the other 9 scored in the 50$^{th}$ percentile or above (C, B, A).

All participating children were born in the Netherlands, but exposed to Turkish at home through their parents, who were all speakers of Turkish. In the DLD group, 3 bilingual children had parents who were both born in Turkey; the other 7 children had one parent who was born in Turkey and one parent who was born in the Netherlands. In the TD group, 6 children had parents who were both born in Turkey, 1 child had one parent who was born in Turkey and one parent who was born in the Netherlands, 3 children had parents who were both born in the Netherlands, and for 1 child this information was not available. At wave 1, information about input in Dutch and Turkish was collected. On average, 35% (bi-DLD) and 38% (bi-TD) of the total input before age 4 was in Dutch (the rest in Turkish). Of the total current input at home at wave 1, 35% (bi-DLD) and 44% (bi-TD) was in Dutch (the rest in Turkish). In the DLD group, 5 parents indicated that their child preferred to speak Turkish at home, 4 indicated that their child preferred to speak Dutch and for 1 child the parents indicated both languages as their preferred language. In the TD group, 2 parents indicated that their child preferred to speak Turkish at home, 3 indicated a preference for Dutch, 4 indicated that both languages were preferred, and for 1 child this information was not available. Children's preferences may have changed at Waves 2 and 3, but this was not verified.

## Materials

### Samples

Speech samples were recordings of a test session in which children produced (semi-)spontaneous speech during a narrative task, which was similarly elicited in Dutch and in Turkish. The narrative task alone did not always yield enough utterances per child to be able to calculate reliable measures. In addition to the stories, we therefore also transcribed an informal conversation with the children prior to the narrative task (in both languages) in which the children were asked about a range of accessible topics including their hobbies, birthday and/or favorite tv-show. This conversation allowed us to elicit more utterances, which benefited the reliability of the language measures. As part of the narrative task, children first listened to a model story told by the research assistant. After hearing a model story, the children were asked to tell a story based on a coherent sequence of six colored pictures either depicting a story about young goats or young birds (MAIN; Gagarina et al., 2012). Afterwards 10 questions about the story in the pictures were asked. The stories were designed for narrative analysis, but the data can also be analyzed for the purpose of studying

grammatical development. Speech samples included the stories the children told as well as all the answers to the questions of the experimenter to increase the total number of utterances. All stories were transcribed using Codes for the Human Analysis of Transcripts (CHAT) transcription format, based on the audio recordings. As a general index of grammatical development, mean length of utterance (MLU) was calculated using Computerized Language Analysis (CLAN) (MacWhinney, 2000), measured in the number of words that children use in their utterances. The counts included unintelligible words ("xxx"), and excluded filled pauses and language switches, that is, in the Turkish data, switches to Dutch and in the Dutch data, switches to Turkish. In the Dutch data, there were only five instances of Turkish words, and < 1% of the words involved a language switch. In the Turkish data, 7.48% of the words involved a language switch to Dutch. For all bilingual children, except one, data on both Turkish and Dutch were available. One bi-DLD child hardly spoke during the Turkish test session at wave 1 and when she spoke, it was almost always in Dutch. Turkish data from waves 2 and 3 are available for this child.

## Coding categories: Grammatical errors in Turkish

Codes relevant for the current study consist of four main categories, namely grammatical errors in the noun phrase (nominal domain), grammatical morpheme errors with verbs (verbal domain), word order errors, and sentence element errors. Uninterpretable/incomplete words and utterances were coded for exclusion. Lexical errors (e.g., using *git* "go" instead of *gel* "come") along with other lexical categories (e.g., use of general-all-purpose words, onomatopoeia) were coded but not included in this study as they were not relevant to grammatical development. Language switches were coded as they are relevant for MLU calculations, as discussed earlier.

Nominal domain errors are comprised of grammatical morpheme errors with case markers, genitive-possessive suffixes and their agreement markers, derivational morphemes, plural marker, and order of suffixation. Verb errors are comprised of errors with tense, agreement, mood, voice, and order of suffixation. Note that derivational morpheme errors were observed in Turkish, but not in Dutch. Because there is no clear-cut distinction between derivation and inflection (Booij, 2006) and because derivational morphemes may be meaningful when describing grammatical markers of DLD, we decided to include the errors with derivational morphemes in Turkish.

Most grammatical morpheme errors in our data are omissions or substitutions of grammatical morphemes. Substitutions refer to the use of incorrect grammatical morphemes. Incorrect addition of a grammatical morpheme and duplication of third person singular possessive suffix were also encountered, though occurrence of the former was rare. In addition to grammatical morpheme errors, we coded errors related to word order and sentence elements. Since Turkish is a (relatively) free word order language, different orders of the verb and its arguments are not considered as an error. The word order errors only include the cases in which the ordering of words caused an ungrammaticality as in (7) where the adverb *geri* "back" should precede and modify the embedded verb *almak* "to take," but instead it precedes and modifies the verb of the main clause.

(7) çünkü topunu almak geri istiyordu.
because ball-3PS.POSS-ACC take-VN back want-PROG-PST
"because he wanted to take his ball back."

Sentence element errors include omissions of obligatory arguments, i.e., subject and object (but importantly, only if their omission was not licensed by the discourse), omission of obligatory sentence elements other than arguments (e.g., verb, subordinators) and incorrectly used sentence elements. The occurrence of word order and sentence element errors was limited.

A full version of the coding scheme, including examples, can be found at: https://osf.io/3z2sj/.

## Coding categories: Grammatical errors in Dutch

As for Turkish, codes fall in one of four main categories and pertain to the grammatical morpheme errors in the noun phrase (nominal domain), grammatical morpheme errors with verbs (verbal domain), word order errors, and sentence element errors. Uninterpretable/incomplete and one-word utterances were coded for exclusion. Errors with prepositions were coded as such but were not included in this study as these were lexical errors (i.e., incorrect meaning, not form). A miscellaneous category included codes for other lexical categories (e.g., use of general-all-purpose words, onomatopoeia) and language switches. Lexical errors were not part of this study. Coding of language switches was relevant in order to exclude them in calculating MLU, as explained earlier.

Noun phrase errors are comprised of grammatical morpheme errors with determiners, pronouns, numerals, adjectival inflections, noun plurals, or diminutives. Verb errors include grammatical morpheme errors with tense and agreement (i.e., finite verbs), and non-finite verbs (i.e., participles, infinitives). Most grammatical morpheme errors are omissions or substitutions of grammatical morphemes. Substitutions refer to the use of incorrect grammatical morphemes. Overregularization errors were coded as a subtype of substitution errors, but they were not treated as grammatical errors in the analyses because they reflect the productive use of a morphological rule and do not indicate a grammatical problem. A third type of error concerns incorrect additions of grammatical morphemes. This was coded but the occurrence of such errors was limited.

In addition to codes about grammatical morphemes, we coded word order and sentence element errors. Word order errors include errors with subject-verb inversion, the absence of verb second in main clauses, and the use of verb second in embedded clause, in addition to a miscellaneous category with other word order errors that do not fall within one of these three subtypes. Sentence element errors include omission of obligatory arguments (i.e., subject, object), omission of obligatory sentence elements other than arguments (e.g., verb, complementizers), incorrectly used sentence elements, and incorrect addition of sentence elements.

A full version of the coding scheme, including examples, can be found at: https://osf.io/3z2sj/.

### Inter-rater reliability

To calculate inter-rater reliability, about 20 percent of the Dutch and Turkish data were coded by two other, independent coders. To select a representative 20 percent of the errors, a Python script went over the data file in which the errors were coded and created an output file in which the following were listed: unique error categories per wave per group, overall unique errors, and tables for each wave showing the error counts per category per child. It was calculated how many errors needed to be included to select a representative 20 percent. Then, the tables showing errors per child were examined manually in Excel. For both Dutch and Turkish data, the children with the most diverse types of errors were selected. The error categories that did not appear in the selected children were detected, and children who made most of those errors were also included in the representative errors file. While selecting children with the most diverse types of errors, the percentage of errors that had to be selected was also considered.

For the Turkish data, the errors of 9 TD children (2 for wave 1, 4 for wave 2, and 3 for wave 3) and 8 DLD children (2 for wave 1, 3 for wave 2, 3 for wave 3) were selected for double coding. For the Dutch data, the errors of 12 TD children (4 different children per wave; some overlap between children across the three waves) and 12 DLD children (4 per wave; as above) were selected. For Dutch, more data were selected because the total sample was larger, including both bilingual and monolingual children.

See Table 2 for an overview of the results for Turkish and Dutch.

For the Turkish data, the inter-rater reliability (kappa) was 0.818 based on 277 instances ($z = 56.2$). However, the second coder had misinterpreted the language mixing category, which is why their coding in this category was replaced with that of a third coder. The data set was otherwise kept the same. The kappa score, then, increased to 0.90 based on again 277 instances ($z = 62.9$). Inter-rater reliability was also calculated per wave per group. The final kappa scores per wave per group for Turkish ranged from moderate to perfect (0.76–1), and for Dutch from moderate to strong (0.69–0.82).

## Procedure

The research was approved by The Standing Ethical Assessment Committee of the Faculty of Social and Behavioral Sciences at Utrecht University (#22-0098). Informed consent forms were signed by parents of participants. Children were individually tested in a quiet room at school. At each wave of data collection, there were two test sessions of $\sim$ 1 h with an experimenter who was a native speaker of Dutch. For the bilingual children, there was also one session of $\sim$1 h with a bilingual experimenter who was a native speaker of Turkish and Dutch. However, the experimenter only spoke Turkish with the child. The session in Turkish was on a different day than the Dutch sessions and was always the first session. The conversation and narrative task in Dutch was administered in the second Dutch session. To avoid any cross-over effects, a different picture sequence of the MAIN was used in the Turkish and in the Dutch session. Thus, if a child told a story about young birds in Turkish, the story about young goats would be used in the Dutch session.

## Data-analysis strategy

To investigate the impact of DLD at the three waves, linear regression models were run for Turkish (RQ1) and Dutch (RQ2), using the lmer function of the lme4 package in R (Bates et al., 2015; R Core Team, 2016). First, we tested whether the inclusion of a random intercept for Child was justified. No further random structure was included because of the small sample size. Second, we ran a model that contained Group, Wave, and the interaction between Group and Wave as fixed-effects predictors, and a second model with only main effects of Group and Wave. Models were compared using a log likelihood ratio test. In the results section, only the optimal model (i.e., the most parsimonious and preferred model) was reported.

For both languages, several dependent variables were used: (1) *Mean length of utterance (MLU)*. (2) *Relative frequency of grammatical errors*. Grammatical errors were errors with grammatical morphemes, word order or sentence elements. The number of grammatical errors was divided by the number of utterances (i.e., relative frequency) and thus controlled for length of the transcript. The denominator included all utterances, except for unintelligible utterances, and, in Dutch, one-word utterances. In Turkish, one-word utterances were not excluded because one-word utterances are common in Turkish because of the pro-drop/argument drop feature of the language (which contrasts with Dutch). Moreover, due to its agglutinative character, one-word utterances can create obligatory contexts for grammatical morphemes in Turkish. (3) *Proportions of omitted and substituted grammatical morphemes*. In Turkish, the proportion of omitted grammatical morphemes was the number of omission errors divided by the sum of grammatical morpheme errors, which included omission,

TABLE 2 Inter-rater reliability for Dutch and Turkish data.

| | Turkish data | | | Dutch data | | |
|---|---|---|---|---|---|---|
| | Number of errors | *z* | *K* | *N* | *z* | *k* |
| Wave 1–DLD | 41 | 17.3 | 0.89 | 227 | 56.9 | 0.77 |
| Wave 1–TD | 59 | 25.7 | 0.87 | 261 | 55.8 | 0.82 |
| Wave 2–DLD | 67 | 31.1 | 0.89 | 362 | 68.6 | 0.69 |
| Wave 2–TD | 36 | 19.1 | 0.97 | 360 | 67 | 0.78 |
| Wave 3–DLD | 38 | 13.6 | 1.00 | 287 | 62.5 | 0.73 |
| Wave 3–TD | 36 | 16.9 | 0.76 | 195 | 45.1 | 0.71 |
| Total | 227 | 62.9 | 0.90 | 1,697 | 158 | 0.75 |

substitution, addition, and duplication errors. The proportion of substitution errors was calculated in a similar way. In Dutch, nearly all grammatical morpheme errors could be captured by omissions and substitutions. Therefore, the proportion of omitted grammatical morphemes was the number of omission errors divided by the sum of omission and substitution errors; because the proportion of substitution errors is the counterpart, it was not necessary to calculate the proportion of substitutions separately. (4) *Proportion of grammatical morpheme errors in the nominal domain*. In both languages, the proportion of grammatical morpheme errors in the nominal domain was the number of errors in the nominal domain divided by the sum of errors in the nominal and verbal domain. The proportion of grammatical errors in the verbal domain is thus the counterpart of the proportion of errors in the nominal domain.

Overregularization was not included in the quantitative analyses because this type of error indicates that children can apply morphological rules rather than reflecting a lack of grammatical knowledge. Because DLD and TD may differ in overregularization, we did include overregularization in the qualitative analyses performed to address RQ1b and RQ2b. The qualitative analyses were aimed at identifying patterns in grammatical morpheme errors that characterized DLD (i.e., clinical markers). To be able to observe more robust patterns, data from the three waves were combined for the qualitative analyses. The availability of data from monolingual Dutch controls enabled us to compare errors with grammatical morphemes in Dutch across bilinguals and monolinguals (RQ3). In so doing, we aimed to establish the reliability and robustness of clinical markers of DLD.

# Results

Below, we first present the quantitative and qualitative results for Turkish (RQ 1), then the quantitative and qualitative results for Dutch (RQ 2 and 3).

TABLE 3 Mean length of utterance (MLU) and relative frequency of grammatical errors in Turkish.

| | Bi-TD ($n = 10$) *M* (SD) | Bi-DLD ($n = 10$)[a] *M* (SD) |
|---|---|---|
| **MLU in words** | | |
| Wave 1 | 2.88 (0.41) | 1.98 (0.61) |
| Wave 2 | 2.88 (0.43) | 2.09 (0.47) |
| Wave 3 | 3.10 (0.57) | 2.25 (0.51) |
| **Relative frequency of grammatical errors**[b] | | |
| Wave 1 | 0.10 (0.06) | 0.10 (0.07) |
| Wave 2 | 0.05 (0.02) | 0.10 (0.05) |
| Wave 3 | 0.04 (0.03) | 0.06 (0.04) |

[a]For Wave 1, n = 9, as one child with DLD did not speak much during the session.
[b]Relative frequency = number of grammatical errors/number of utterances; grammatical errors = errors with grammatical morphemes + word order errors + sentence elements errors.

## Turkish

### Grammatical development in Turkish

Table 3 shows utterance length (MLU in words) and relative frequency of grammatical errors. The absolute numbers per error type (grammatical morphemes, word order, sentence elements) can be found in the Supplementary material. Errors with word order and sentence elements were infrequent.

#### MLU in Turkish

The optimal model showed a significant main effect for Group ($\beta = -0.85$, $SE = 0.17$, $p < 0.001$), indicating that the bi-TD children produced longer utterances than the bi-DLD children. The difference in MLU between Waves 1 and 3 was marginally significant ($\beta = 0.25$, $SE = 0.13$, $p = 0.05$), whereas the difference between Waves 1 and 2 was not ($\beta = 0.06$, $SE = 0.13$, $p = 0.63$). An analysis with Wave 2 as the reference level showed that the difference between Waves 2 and 3 was also not

TABLE 4 Proportions of grammatical morpheme errors per type and domain in Turkish.

| | bi-TD ($n = 10$) $M$ (SD) | bi-DLD ($n = 10$)[a] $M$ (SD) |
|---|---|---|
| **Omission errors**[b] | | |
| Wave 1 | 0.35 (0.29) | 0.48 (0.31) |
| Wave 2 | 0.51 (0.36) | 0.68 (0.21) |
| Wave 3 | 0.24 (0.27) | 0.65 (0.39) |
| **Substitution errors**[b] | | |
| Wave 1 | 0.35 (0.26) | 0.31 (0.30) |
| Wave 2 | 0.18 (0.16) | 0.21 (0.22) |
| Wave 3 | 0.48 (0.26) | 0.27 (0.31) |
| **Errors in nominal domain**[c] | | |
| Wave 1 | 0.81 (0.20) | 0.69 (0.36) |
| Wave 2 | 0.83 (0.19) | 0.82 (0.20) |
| Wave 3 | 0.80 (0.32) | 0.63 (0.38) |

[a]For Wave 1, n = 9, as one child with DLD did not speak much during the session.
[b]Some errors could not be classified as either omissions or substitutions (e.g., duplications, additions), which is the reason why the sums of proportions of omission and proportions of substitution errors do not add up to 1.
[c]Errors in the verbal domain are the complement of errors in the nominal domain.

significant ($\beta = 0.20$, $SE = 0.12$, $p = 0.11$). These results suggest that utterance length increased marginally between the first and third year across bi-TD and bi-DLD children.

### Relative frequency of grammatical errors in Turkish

The optimal model revealed a marginally significant effect of Group ($\beta = 0.02$, $SE = 0.01$, $p = 0.06$), suggesting that the bi-DLD group made slightly more grammatical errors than the bi-TD children. The difference between Waves 1 and 3 in relative frequency of grammatical errors was significant ($\beta = -0.05$, $SE = 0.02$, $p = 0.001$), and both the difference between Waves 1 and 2 ($\beta = -0.03$, $SE = 0.02$, $p = 0.09$) and Waves 2 and 3 was not significant ($\beta = -0.02$, $SE = 0.01$, $p = 0.10$). These results suggest that relative frequency of grammatical errors across bi-TD and bi-DLD groups decreased over time between the first and third year of data collection.

### Errors with grammatical morphemes in Turkish: Omission and substitution

Table 4 provides more detailed information about grammatical morpheme errors, specifically the proportions of omissions and substitutions of grammatical morpheme errors as well as the proportion of grammatical morpheme errors in the nominal domain. The denominators were always the sum of grammatical morpheme errors.

Regarding the proportion of omission errors, the optimal model with main effects of Wave and Group showed a significant effect of Group ($\beta = 0.23$, $SE = 0.08$, $p = 0.01$), suggesting that the bi-DLD children made more omission errors than bi-TD children. The difference between Wave 1, Wave 2 and Wave 3 was not significant. Regarding the proportion of substitution errors, the optimal model with main effects of Wave and Group showed no significant difference between bi-TD and bi-DLD children ($\beta = -0.07$, $SE = 0.07$, $p = 0.33$) and a significant difference only between Waves 2 and 3 ($\beta = 0.17$, $SE = 0.08$, $p = 0.04$), indicating that across bi-TD and bi-DLD groups, the substitution errors increased between Waves 2 and 3.

### Errors with grammatical morphemes in Turkish: Nominal and verbal domain

The optimal model was a model with only main effects, but neither the effect of Wave nor the effect of Group reached statistical significance, indicating that the proportion of errors in the nominal domain relative to the verbal domain did not differ across the three waves and across the groups.

## Types of errors with grammatical morphemes in Turkish

Most grammatical morpheme errors in Turkish were in the nominal domain, comprising 80% of the errors; 20% were in the verbal domain. Below, errors in the nominal and verbal domain will be described in greater detail. To illustrate how the distribution of errors is different between the bi-TD and bi-DLD groups, pie charts were created for the most prominent error categories. The pie charts demonstrate the percentage of types of errors (e.g., omission, substitution) with the encoding of a certain grammatical feature or aspect (e.g., accusative case).

### Nominal domain in Turkish

Numerically, the number of errors with grammatical morphemes in the nominal domain was quite similar in the two groups (bi-TD: $n = 144$ vs. bi-DLD: $n = 159$), but the complexity and distribution of the errors differed across groups. In terms of complexity, the errors that involved an embedded noun clause structure, which is more complex than a simple noun clause structure, constituted 9% of the errors in the bi-TD group and 0.6% of the errors in the bi-DLD group. Pie charts were created for accusative and dative case (Figure 1) errors, and possessive suffix and genitive case (Figure 2) errors. Below, we will discuss the patterns for these two categories in greater detail.

#### Accusative and dative case errors

The pie charts for case errors (Figure 1) include accusative and dative case since accusative case was mostly substituted with dative case (67%) and vice versa (71%). The bi-DLD children made more errors with accusative and dative cases ($n = 78$) than the bi-TD children ($n = 28$). Figure 1 shows that while there was a similar distribution of omission and substitution of accusative and dative cases in the bi-TD group, omission of accusative case was relatively frequent in the bi-DLD group

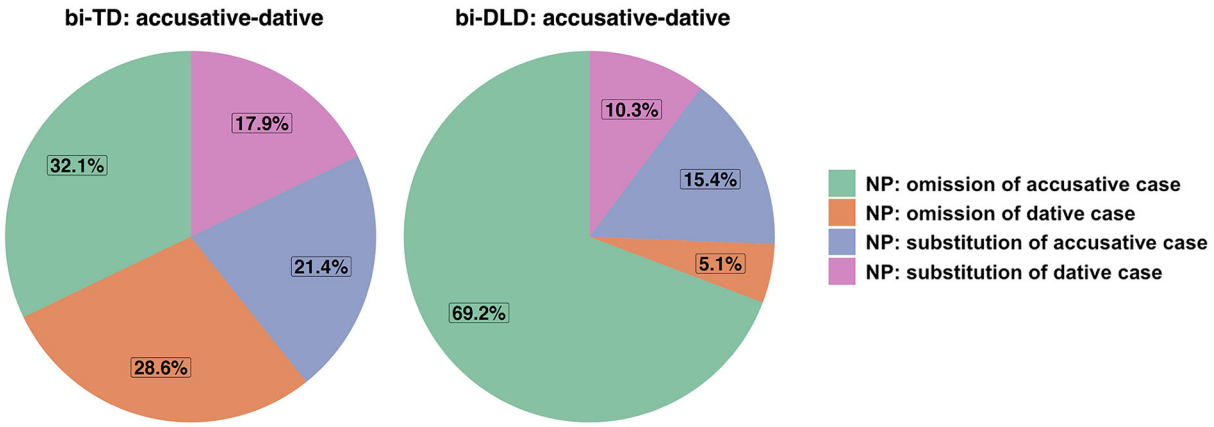



FIGURE 1
Distributions of accusative-dative errors in Turkish in the bi-TD and bi-DLD group.

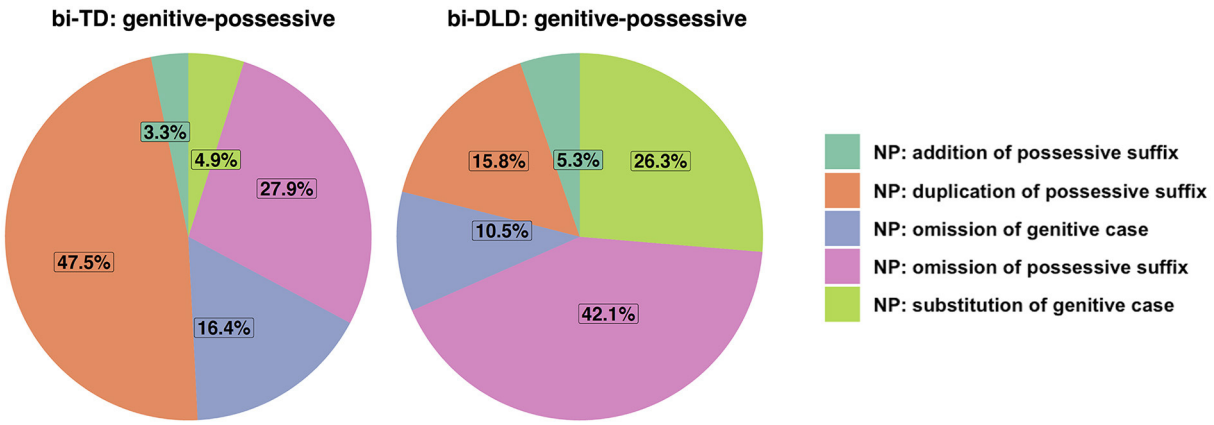



FIGURE 2
Distributions of genitive-possessive errors in Turkish in the bi-TD and bi-DLD group.

compared to bi-TD group. This pattern of findings suggests that bi-DLD children had most problems with using accusative case in obligatory contexts.

Accusative case was almost always substituted with dative case in the bi-TD group. In the bi-DLD group, accusative case was more diversely substituted with other case markers, but still mostly with dative case. The example in (8) below shows how accusative case was substituted with dative case by a bi-TD child in Wave 1. In (8), the direct object of the verb *ye-* "eat" was incorrectly marked with dative case instead of accusative case.

(8) kuşɸ ona [: onu] [*] yiyo(r).
bird-NOM it-DAT [: it-ACC] eat-PROG-3SG.
"The bird is eating it."

When dative case was substituted in the bi-TD group, it was always substituted with accusative case. In the bi-DLD group, this was true for half of the substitutions. In the other cases, it was substituted with locative or instrumental case. Two of the five instances in the bi-TD group included substitution of dative case on the nominalized verb of the embedded noun clause. Since such errors involve case marking on a clause level, they are more complex than substitution of a case marker on a simple noun. In (9), the verb of the main clause *yardım et-* "help" requires the embedded noun clause to bear dative case, yet a bi-TD child at Wave 1 marked the embedded nominalized verb *yüzme* "swimming" with accusative case. No such errors were present in the bi-DLD group.

(9) sora anne kuzu yardım ediyo(r) yüzmesini [: yüzmesine] [*].
then mother lamb help make-PROG-3SG swim-VN-3SG.POSS-ACC [:swim-VN-3SG.POSS-DAT]
"The mother lamb is helping (her baby) swim."

**Possessive suffix and genitive case errors**

Regarding genitive-possessive constructions, the bi-TD children made numerically more errors than the bi-DLD children ($n = 61$ vs. $n = 38$). As Figure 2 shows, duplication of possessive suffix accounted for almost half of the errors in the bi-TD group, whereas in the bi-DLD group omission of the possessive suffix held the highest percentage.

Omission of possessive suffix was numerically similar in the two groups (bi-TD: $n = 17$, bi-DLD: $n = 16$). However, in the bi-TD group, 7 of these errors were due to a missing 3rd person singular marker *-(s)I* in noun compound structures, while such cases were almost non-existent in the bi-DLD group ($n = 1$). In the example below, the target word was *yarış arabası* "race car," which is a type of compound in Turkish that consists of two nouns. The first noun *yarış* "race" is in the bare form while the second noun *araba-sı* is marked with the 3rd person singular possessive suffix *-(s)I*. (10) illustrates a case in which a bi-TD child in Wave 1 omitted the possessive suffix in the second noun of this compound.

(10) yarış araba [: arabası] [*].
race car [: car-3SG.POSS]
"race car."

This type of omission of the possessive suffix is different from omission of possessive suffix in regular genitive-possessive constructions, because in compound NPs it does not imply possession of one thing by another. Example (11) below illustrates omission of possessive suffix in a case where it signifies a possession. In (11), a bi-DLD child at Wave 2 says *anne* "mother" instead of *annem* "(my) mother", omitting the 1st person singular possessive suffix *–(I)m*.

(11) anne [: annem] [*] yapıyo(r).
mother [: mother-1SG.POSS] make-PROG-3SG
"My mother is making it."

Omission of genitive case was numerically higher in the bi-TD ($n = 10$) than in the bi-DLD ($n = 4$) group. In the bi-TD group, almost half of these errors involved an embedded noun clause, such that the genitive case was omitted on the embedded clause subject, whereas all omission of genitive case errors in bi-DLD were simple genitive-possessive construction errors. In example (12) below from a bi-TD child at Wave 2, *fare* "mouse" is the subject of the embedded clause, and it should have been marked with genitive case. The embedded clause is marked with parentheses in the sentence below.

(12) çünkü (fare [: farenin] [*] ondan kaçmıcanı [: kaçmayacağını]) düşünmüş.
because mouse [: mouse-GEN] he-ABL run-away-NEG-FUT-3SG.POSS-ACC think-PST-3SG
"Because he thought the mouse would not run away from him."

Omission of genitive case in such cases points to a more complex type of error compared to omission of genitive case in simpler genitive-possessive constructions as shown in example (12) below, produced by a child with DLD at Wave 3. In (13), the child says *o topu* "he ball" instead of *o-nun topu* "his ball," omitting the genitive case.

(13) çünkü [/] çünkü o [: onun] [*] topu suyun içindeydi.
because [/] because he [: he-GEN] [*] ball-3SG.POSS water-GEN inside-3SG.POSS-LOC-PST.
"Because his ball was in the water."

### Verbal domain in Turkish

The bi-DLD group made more errors ($n = 49$) than the bi-TD group ($n = 29$). Figure 3 shows the distribution of agreement and tense errors in the verbal domain in the two groups. Bi-TD children never omitted tense suffixes, while bi-DLD children did so in 18% of the cases shown in Figure 3. The percentage of omission of agreement was quite similar in the bi-TD and bi-DLD groups. While the percentage of substitution of agreement markers was higher in the bi-TD than in the bi-DLD group, the percentage of substitution of tense markers with another tense marker was higher in the bi-DLD than in the bi-TD group. The frequency of these errors is, however, low.

## Dutch

### Grammatical development in Dutch

Table 5 shows utterance length (MLU in words) and relative frequency of grammatical errors. The absolute numbers per error type (grammatical morphemes, word order, sentence elements) can be found in the Supplementary material.

### MLU in Dutch

The optimal model showed a significant effect of Group ($\beta = -1.43$, $SE = 0.32$, $p < 0.001$), indicating that Bi-DLD children used shorter utterances than Bi-TD children. Wave 3 differed significantly from Wave 2 ($\beta = 0.52$, $SE = 0.17$, $p = 0.003$) and Wave 1 ($\beta = 0.60$, $SE = 0.17$, $p < 0.001$). An analysis with Wave 2 as the reference level shows that there is no statistically significant increase of MLU between Waves 2 and 3. These results suggest that utterance length increased between the first and third year across the bi-TD and bi-DLD children.

### Relative frequency of grammatical errors in Dutch

The interaction model turned out to be the optimal model, but showed no significant effects for Wave or Group, or a significant interaction effect.

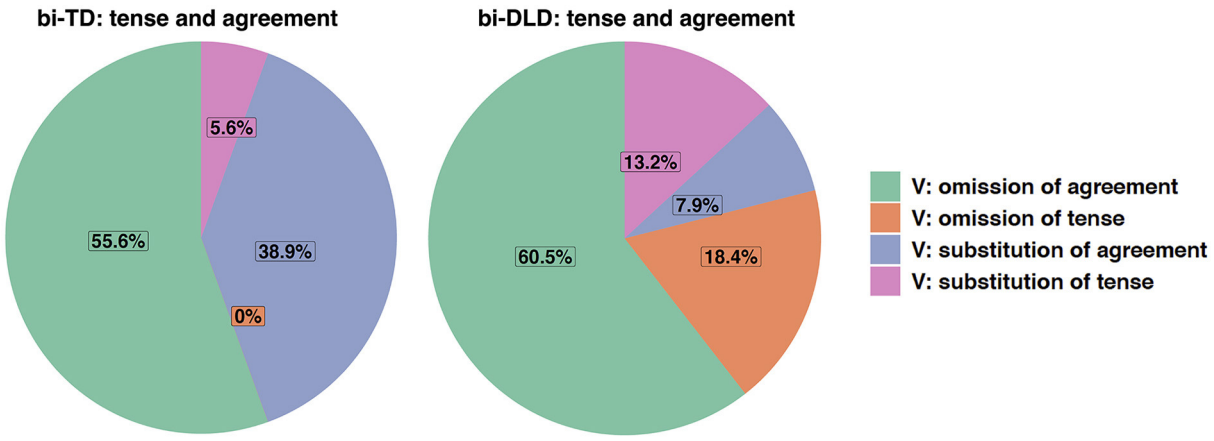



FIGURE 3
Distributions of tense and agreement errors in Turkish in the bi-TD and bi-DLD group.

TABLE 5 Mean length of utterance (MLU) and relative frequency of grammatical errors in Dutch.

| | bi-TD ($n = 10$) $M$ (SD) | bi-DLD ($n = 10$) $M$ (SD) |
|---|---|---|
| **MLU in words** | | |
| Wave 1 | 4.29 (0.62) | 2.65 (0.76) |
| Wave 2 | 4.76 (0.90) | 3.22 (0.94) |
| Wave 3 | 4.62 (1.04) | 3.52 (0.63) |
| **Relative frequency of grammatical errors**[a] | | |
| Wave 1 | 0.29 (0.08) | 0.20 (0.09) |
| Wave 2 | 0.28 (0.13) | 0.28 (0.09) |
| Wave 3 | 0.23 (0.09) | 0.26 (0.09) |

[a]Relative frequency = number of grammatical errors/number of utterances; grammatical errors = errors with grammatical morphemes + word order errors + sentence elements errors.

TABLE 6 Proportions of grammatical morpheme errors per type and domain in Dutch.

| | bi-TD ($n = 10$) $M$ (SD) | bi-DLD ($n = 10$) $M$ (SD) |
|---|---|---|
| **Omission errors**[a] | | |
| Wave 1 | 0.22 (0.26) | 0.84 (0.16) |
| Wave 2 | 0.29 (0.12) | 0.52 (0.24) |
| Wave 3 | 0.44 (0.26) | 0.55 (0.30) |
| **Errors in nominal domain**[a] | | |
| Wave 1 | 0.76 (0.11) | 0.47 (0.26) |
| Wave 2 | 0.83 (0.09) | 0.62 (0.26) |
| Wave 3 | 0.76 (0.14) | 0.59 (0.19) |

[a]Substitution errors and errors in the verbal domain are the complements of omission errors and errors in the nominal domain, respectively.

## Errors with grammatical morphemes in Dutch: Omissions and substitution

Table 6 provides more detailed information about grammatical morpheme errors, specifically the proportions of omissions of grammatical morphemes and proportion of grammatical morpheme errors in the nominal domain. The denominators are respectively the sum of omission and substitutions of grammatical morphemes, and the sum of grammatical morpheme errors in the nominal and verbal domain.

Regarding the proportion of omissions of grammatical morphemes, the optimal model showed a significant interaction between Group and Wave 2 ($\beta = -0.39$, $SE = 0.15$, $p = 0.01$) and between Group and Wave 3 ($\beta = -0.51$, $SE = 0.15$, $p = 0.001$), in addition to main effects of Group ($\beta = 0.62$, $SE = 0.10$, $p < 0.001$) and Wave 3 ($\beta = 0.22$, $SE = 0.10$, $p = 0.04$). Figure 4 illustrates the interaction effect showing that at Wave 1 (reference level), the proportion of omissions was higher for the bi-DLD group than the bi-TD group and that the difference between the two groups is smaller at Waves 2 and 3. Recall that the number of substitutions is the counterpart; consequently, the proportion of substitutions is higher for bi-TD than bi-DLD at Wave 1 and this difference is smaller at Waves 2 and 3.

## Errors with grammatical morphemes in Dutch: Nominal and verbal domain

The optimal model showed a significant effect of Group: the bi-DLD group made more errors in the verbal domain, and, reversely, the bi-TD group made more errors in the nominal domain ($\beta = -0.22$, $SE = 0.06$, $p < 0.001$). In addition, the

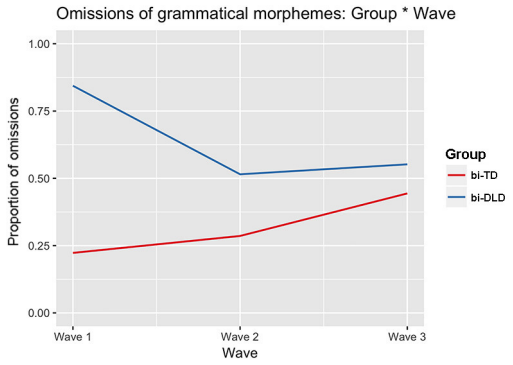



FIGURE 4
Interaction effect between Group and Wave on the omission of grammatical morphemes in Dutch.

effect of Wave 2 reached statistical significance ($\beta = 0.11$, $SE = 0.05$, $p = 0.03$), suggesting that the proportion of grammatical morphemes errors in the nominal domain is larger at Wave 2 compared to Wave 1.

## Types of grammatical morpheme errors in Dutch

In this section, types of errors with grammatical morphemes are discussed for bi-DLD and bi-TD (research question 2b), and compared with monolingual controls (mo-DLD, mo-TD) to determine whether error patterns depend on bilingualism (research question 3). Grammatical morpheme errors in Dutch were more frequent in the nominal domain compared to the verbal domain, comprising 60% and 40% of all grammatical morpheme errors, respectively. This pattern in the bilinguals resembled that in the monolingual controls, who had 65% of their grammatical morpheme errors in the nominal domain and 35% in the verbal domain. For the purpose of interpretation, it is relevant to mention that these percentages may not only represent a contrast between domains but also between free-standing and bound grammatical morphemes: in Dutch, in the nominal domain, grammatical morphemes are predominantly free-standing whereas in the verbal domain, bound grammatical morphemes predominate. This confound interferes with the cross-linguistic comparison as in Turkish, there is no such distinction.

### Nominal domain in Dutch

Numerically, bi-TD children ($n = 378$) made more errors than bi-DLD children ($n = 211$). Most prominent were errors with determiners and pronouns, which are free-standing grammatical morphemes. In the bi-TD group, errors with determiners (48%) and pronouns (44%) accounted for 92% of the errors with grammatical morphemes in the nominal domain; in the bi-DLD group, this is also 92%, but errors with determiners (62%) were more frequent than pronoun errors (30%). To illustrate error distributions in the bi-TD and bi-DLD groups, pie charts were created for determiners (Figure 5) and pronouns (Figure 6). Numerically, mo-TD children ($n = 211$) made fewer errors than mo-DLD children ($n = 242$). In the mo-TD group, errors with determiners and pronouns accounted for 93% (determiners: 27%, pronouns: 66%) of the errors with grammatical morphemes in the nominal domain; in the mo-DLD group, this was 95% (determiners: 55%, pronouns: 40%).

#### Determiner errors

Figure 5 shows that the patterns of errors with determiners are quite similar for the bi-DLD and bi-TD children, although the former group may omit determiners slightly more often. Errors in both groups comprise missing and substituted determiners, i.e., use of the common gender definite determiner *de* or demonstrative *die* (bi-TD: $n = 102$, bi-DLD: $n = 86$) instead of the neuter gender definite determiner *het* or demonstrative *dat* (bi-TD: $n = 82$; bi-DLD: $n = 45$). Example (14), which is produced by a bilingual TD child at Wave 2 and contains a diminutivized noun (which is always neuter gender in Dutch), illustrates a substitution of the demonstrative. Substitution of definite determiners by indefinite determiners, and vice versa, hardly ever occurred. Patterns in the monolingual groups closely resemble those in the bilingual groups.

(14) en die [: dat] [*] koe+tje viel eraf.
and that-DEM.COM cow-DIM fall-PST it+from
"and the little cow fell from it."

#### Pronoun errors

Children in the bi-TD and bi-DLD groups made a variety of errors with pronouns, as shown in Figure 6. The most prominent difference between the groups concerns the substitution of possessive pronouns such as *mijn* ("mine") or *zijn* ("his") by personal pronouns such as *mij* ("my") or *hem* ("him"), as illustrated in example (15), which is produced by a bilingual TD child at Wave 1. These errors are not only numerically more frequent in the bi-TD group ($n = 109$) than in the bi-DLD group ($n = 21$), but they are also relatively more frequent. While the mo-TD and mo-DLD groups show in this respect the same pattern as the bi-TD group, there is no predominant error in the bi-DLD group. Also, in the bi-DLD group, the category "unspecified" (which contains a variety of errors that do not fit any of the other error categories) is relatively large. Use of *hun* "them" in subject position instead of the required nominative form *zij* or *ze* "they" is common in colloquial Dutch and may, therefore, not count as an error.

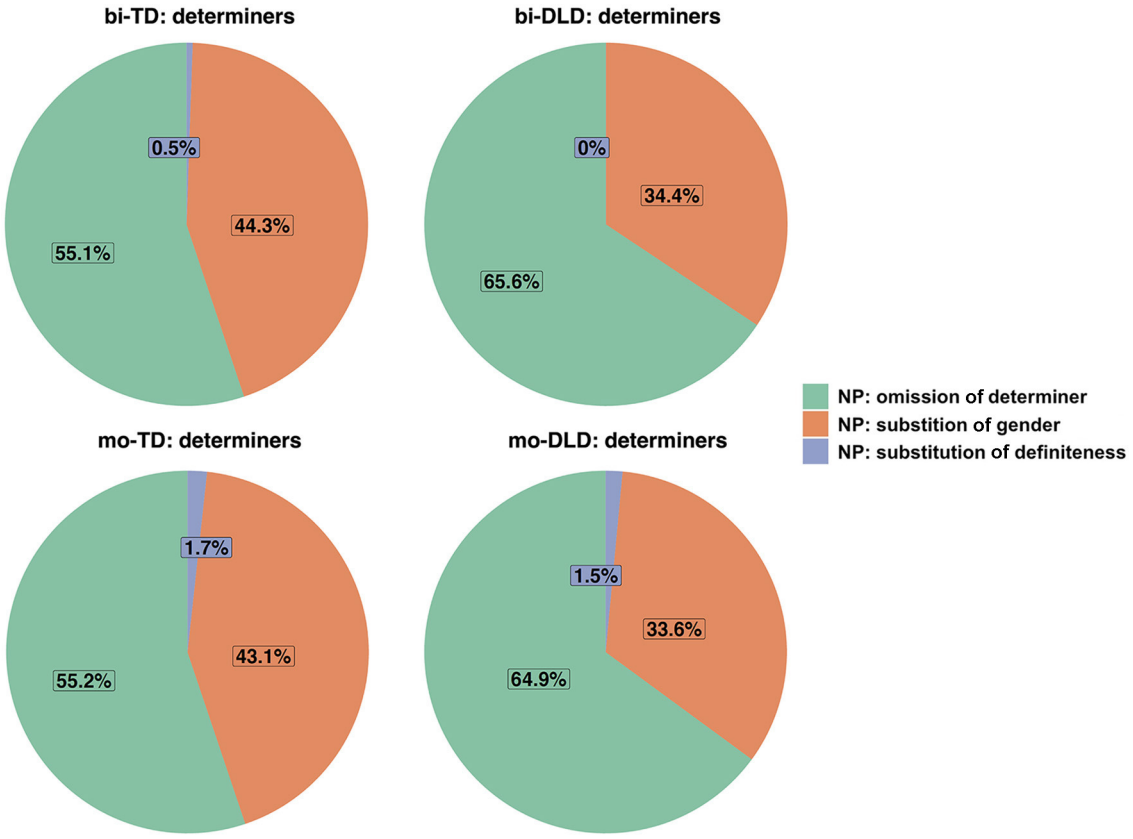



FIGURE 5
Distributions of determiner errors in Dutch in the bi-TD, bi-DLD, mo-TD, and mo-DLD group.

(15) omdat hij hem [: zijn] [*] bal terug heeft.
because he-3SG.ACC/DAT ball back have-3SG.PRES
"because he has his ball back."

## Verbal domain in Dutch

The bi-TD children made fewer errors ($n = 167$) than the bi-DLD children ($n = 227$). In the bi-TD group, errors with finite verbs and non-finite verbs accounted for, respectively, 89 and 10% of the errors with grammatical morphemes in the verbal domain; in the bi-DLD group, the percentages are 88 and 11%, respectively. Most errors with finite and non-finite verbs are substitutions and omissions of bound grammatical morphemes (i.e., affixes), and contrast in this respect with the determiner and pronoun errors in the nominal domain. To illustrate the distribution of errors in the bi-TD and bi-DLD groups, pie charts were created for finite verbs (Figure 7) and non-finite verbs (Figure 8). Below, we will discuss the patterns in greater detail, thereby again comparing bilinguals with monolingual controls to determine whether error patterns are dependent on bilingualism. Numerically, the mo-TD children ($n = 61$, finite verbs: 84%, non-finite verbs: 5%) made fewer errors with verbs than the mo-DLD children ($n = 179$, finite verbs: 93%, non-finite verbs: 8%).

### Agreement and tense errors

The bi-DLD children used root infinitives much more often ($n = 69$) than the bi-TD children ($n = 6$). A similar pattern can be seen in the mo-DLD children ($n = 36$) vs. the mo-TD children ($n = 3$). In example (16) below, a bi-DLD child at Wave 2 uses a root infinitive, which is defined by the lack of a finite verb in second position and presence of an infinitive (vasthouwe) following the direct object (feet).

(16) hij voete(n) vasthouwe [*].
he-NOM.3SG foot-PL hold-INF
"he holds feet."

Like root infinitives, which have an infinitival suffix but lack agreement and tense marking, use of bare verbs reflects omission of obligatory agreement and tense marking. While in the bi-DLD group root infinitives are more frequent than bare verbs ($n = 26$), the two errors are about equally frequent in the mo-DLD group. Bare verbs are found less often in the bi-TD ($n = 9$) and mo-TD groups ($n = 7$) than in the two DLD groups, similar to

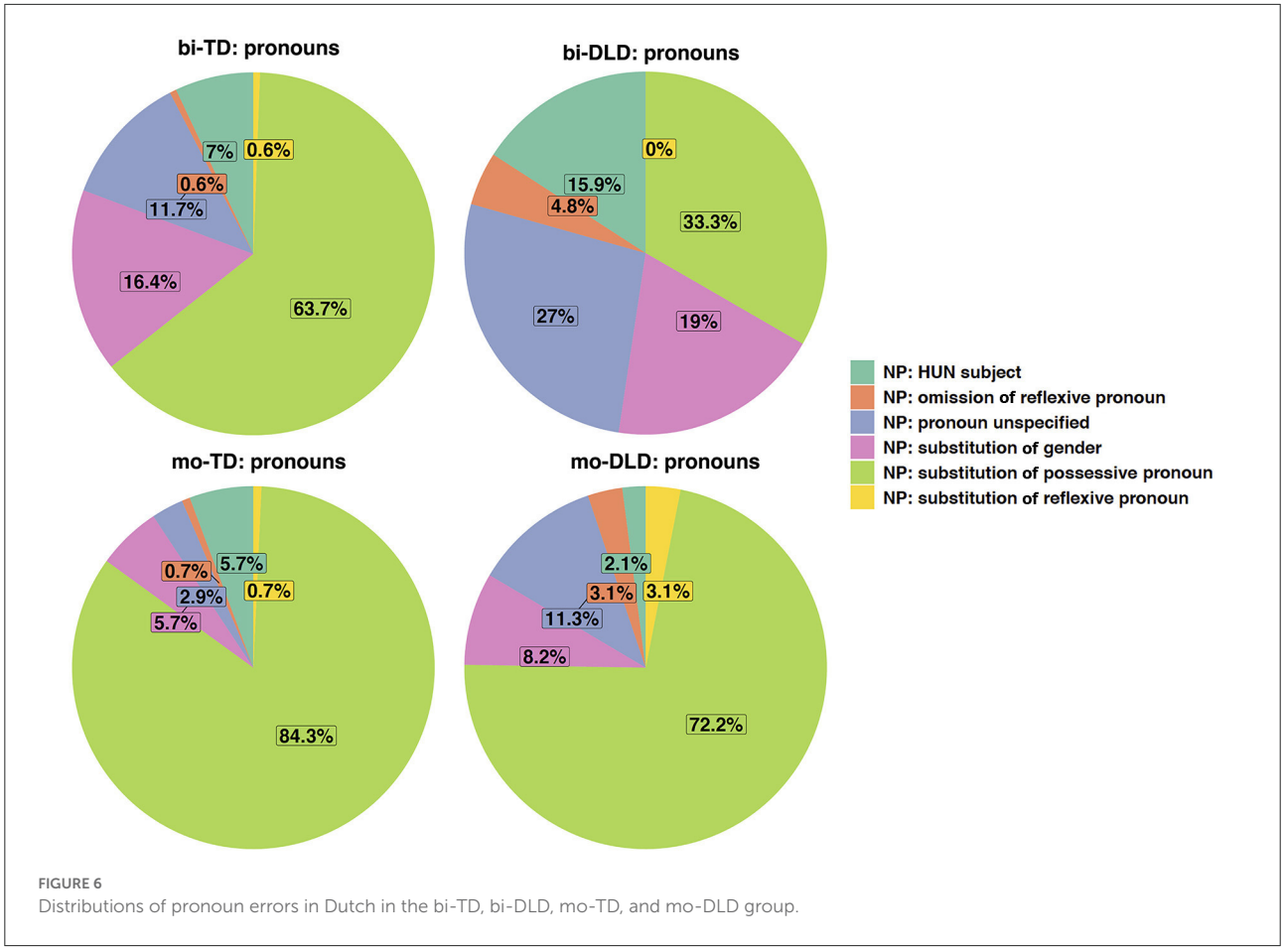



FIGURE 6
Distributions of pronoun errors in Dutch in the bi-TD, bi-DLD, mo-TD, and mo-DLD group.

root infinitives. However, in relative terms and as illustrated in the pie charts, bare verbs seem somewhat less typical of DLD than root infinitives. The example below shows a bi-DLD child at Wave 2 using the bare stem *wil* (instead of the inflected plural form *willen*).

(17) hun [: zij] [*] wil [: willen] [*] een worme [: worm] ete(n).
them want-STEM a worm eat-INF
"they want to eat a worm."

Overregularizations, in contrast to root infinitives and bare verbs, were more frequent in the bi-TD group ($n = 57$) than in the bi-DLD group ($n = 28$), and account for quite a large portion of errors with finite verbs in both the bi-TD and mo-TD groups, as indicated in Figure 7. Overregularization occurred with irregular agreement and tense forms (where a regular inflectional suffix is added to the stem instead of using the target irregular form). Below in example (18), a bi-TD child at Wave 3 uses the regular past tense suffix *-de* with the stem *klim* "climb" instead of the target irregular form *klom*.

(18) de poes klimde [: klom] [*] op de boom
the cat climb-SG-PST on the tree
"the cat climbed in the tree."

### Errors with participles

Figure 8 shows errors with infinitives and participles. In Dutch, infinitives and participles are morphologically marked with, respectively, an infinitival suffix (-en) and a circumfix (ge_d/t, ge_en). The bi-DLD children showed relatively many omissions of participial affixes ($n = 14$) and they substituted participial affixes ($n = 2$) and overregularized irregular participles ($n = 7$) less often than the bi-TD children (omission: $n = 2$, substitution: $n = 5$, overregularization: $n = 9$). That TD children overregularize more than children with DLD can also be observed in monolinguals.

Omission of the participial suffix is illustrated below in (19), where a bi-DLD child at Wave 2 uses *gekreeg* ("received") instead of *gekregen*, not using the suffix *-en*, while using the prefix *ge-* and changing the stem vowel to create an irregular form.

(19) en ik heb nog een kettings [: kettingen] [*] gekreeg [: gekregen] [*] voor m'n verjaardag.
and I have-1SG.PRES also a necklaces receive-PTC for my birthday

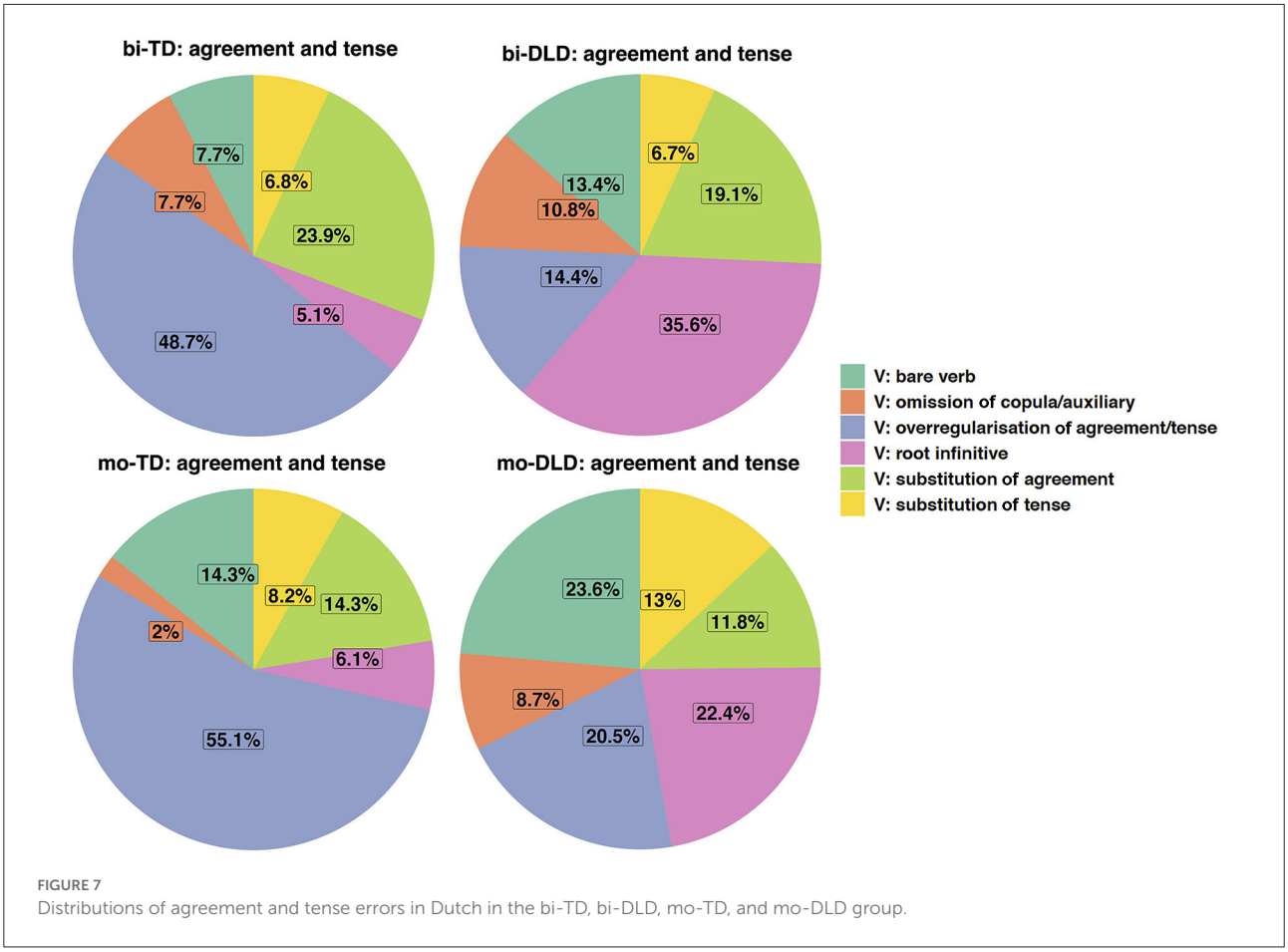



FIGURE 7
Distributions of agreement and tense errors in Dutch in the bi-TD, bi-DLD, mo-TD, and mo-DLD group.

"and I have also been given a necklace for my birthday."

## Discussion and conclusion

In this longitudinal study, we investigated children's simultaneous grammatical development over the course of a 2-year period, to determine how DLD impacts on both the heritage language (Turkish) and societal language (Dutch). Below, we discuss the most important results of our study in relation to the three research questions that guided the study.

### Effects of DLD on Turkish learned as a heritage language

Heritage language development can be at risk because of limited input and use at home and a lack of support in schools (De Houwer, 2007; Montrul, 2008; Restrepo et al., 2010; Hoff, 2018). The question arises how this specific and often challenging context of heritage language learning interacts with the limited language learning abilities of children with DLD. Because previous research on this group of language learners focused on the societal language, a complete picture of bilingual development in this group of language learners is lacking. If the heritage language is not well developed in both children with and without DLD, this would limit the diagnostic potential of heritage language assessment. Therefore, we wanted to know whether grammatical development in heritage Turkish differs between Turkish-Dutch children with and without DLD, both quantitatively and qualitatively.

In Turkish, the bi-DLD children in our study used shorter utterances than the bi-TD children and they also tended to make more grammatical errors, which were mostly errors with grammatical morphemes, and to a lesser extent, errors with sentence elements. Word order errors were infrequent in both bi-DLD and bi-TD groups, which is not surprising, given the relatively free word order in Turkish. Regarding grammatical morphemes, children in the bi-DLD group made more omission errors than children in the bi-TD group, whereas the groups did not differ in substitution of grammatical morphemes. Grammatical morpheme errors were made in both the nominal and verbal domain, but both groups made more errors in the nominal domain, as has been suggested in previous literature

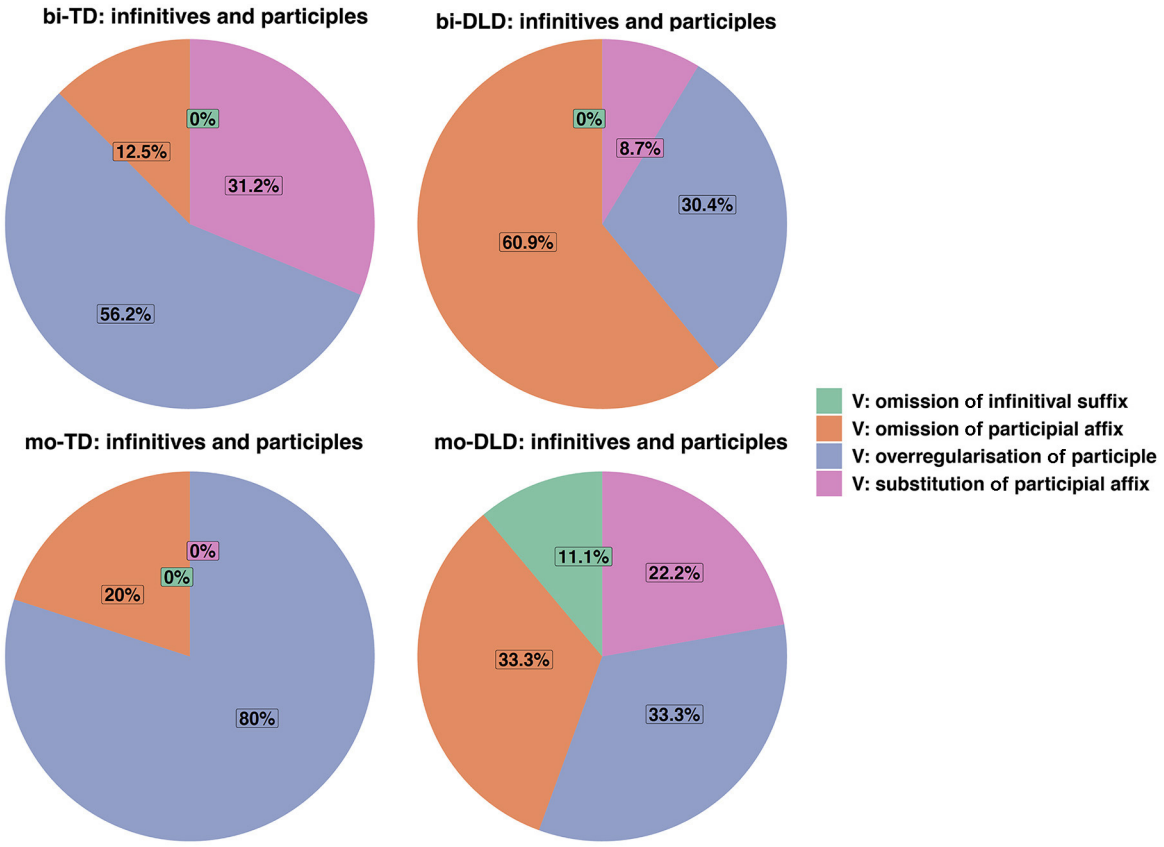



FIGURE 8
Distributions of infinitives and participles in Dutch in the bi-TD, bi-DLD, mo-TD, and mo-DLD group.

(Acarlar and Johnston, 2006, 2011). Like the bilingual children in our study, previous research showed that monolingual Turkish children with DLD tend to make omission errors (Güven and Leonard, 2020, 2021). In these respects, our study suggests that effects of DLD in heritage Turkish learned in the Netherlands resemble those in monolingual Turkish learned in Turkey.

The three-wave longitudinal design of the present study enabled us to investigate development across the bi-TD and bi-DLD groups. Longitudinal analyses revealed that the relative frequency of grammatical errors decreased over time, while the mean length of utterance showed some increase during the period that we investigated. Both findings support the same conclusion, namely that the children continued to develop their Turkish. Previous studies have indicated that children's Turkish development is under pressure (Akoğlu and Yağmur, 2016; Backus and Yağmur, 2017), and it is promising that the children in our study who are born and raised in the Netherlands, and who are second or third generation migrants, are still developing their Turkish skills even after spending some years in a Dutch-speaking school environment. In most bilingual families that participated, Turkish was spoken at home at least half of the time, and sometimes even more than 80% of the time. These percentages confirm earlier observations about Turkish migrant families in the Netherlands, which indicated strong intergenerational transmission and maintenance of Turkish (Extra and Yağmur, 2010). Most probably, frequent Turkish input at home contributed to the continuing Turkish development of the children who participated in our study. It remains to be seen whether children continue to develop their Turkish at the same rate at later ages, as pressure of Dutch will become stronger when children grow older. A third developmental finding was that the proportion of substitution errors increased. This increase of substitutions was observed between the second and third wave of data collection, which may be compatible with the idea that substitution errors reflect a later phase in development in which learners know that a grammatical position needs to be filled, but the feature specifications of the different grammatical morphemes are still unstable, and, perhaps, partly underspecified, resulting in mismatches and substitution errors (see, for an overview of relevant theoretical accounts: Ionin, 2013). Finally, no significant interactions were found, which indicates that developmental patterns did not differ between the bi-TD and bi-DLD children. We tentatively predicted that

children with DLD may develop at a slower pace than their TD peers because of input processing limitations coupled with limited input and use. The absence of an interaction is not in line with this prediction and may indicate that Turkish input and use are sufficient for children whose ability to learn language is impaired. This could be related to high levels of heritage language maintenance in the Turkish community and does not necessarily generalize to heritage languages that are transmitted less and that have lower levels of maintenance. For example, in the Netherlands, heritage language maintenance is stronger among migrants from Turkish descent compared to migrants from Moroccan descent who speak Berber languages (Extra and Yağmur, 2010).

In addition to quantitative analyses, we performed qualitative analyses of grammatical morpheme errors. Children in both groups produced a variety of errors, in line with (Güven and Leonard, 2020, 2021) observations based on monolingual Turkish children with and without DLD. However, children also showed a large degree of interindividual variation, similar to what has been reported for child heritage learners of Turkish in Germany (Rothweiler et al., 2010). Like in other studies, investigating both monolingual and bilingual learners of Turkish, we found that accusative case was a locus of errors. Rothweiler et al. (2010) concluded that the Turkish-German bilingual children with DLD in their study omitted and substituted accusative case. While we found that substitutions (mostly with dative case) did occur in the bi-DLD children, relative frequency data revealed that omissions are more typical for the bi-DLD group, in line with studies on monolingual Turkish (Güven and Leonard, 2020). Although accusative case errors are also common in monolingual learners of Turkish, such errors must be interpreted with caution in the context of Turkish learned as a heritage language. Accusative case errors may be developmental in nature, but we cannot exclude the possibility that children are exposed to such "errors" because it is a characteristic of Turkish spoken in the Netherlands (Doğruöz and Backus, 2009). Focusing on accusative case errors to establish a DLD diagnosis in the context of Turkish as a heritage language could thus contribute to overdiagnosis.

The patterns of errors regarding the genitive-possessive construction were different across the two groups as well. The bi-DLD group tended to omit the possessive suffix, while the bi-TD group tended to duplicate the possessive suffix. Interestingly, when the genitive suffix was omitted by a bi-TD child, this often involved an embedded noun clause, such that the genitive case was omitted on the subject of the embedded clause. In contrast, all omissions of genitive case in the bi-DLD group involved simple genitive-possessive construction errors. In other words, omission errors in the bi-TD group may have surfaced because they attempted to utter complex constructions, and not because they have not mastered the genitive case per se. In a similar vein, unlike children in the bi-DLD group, children in the bi-TD group sometimes substituted dative case on the nominalized verb of the embedded noun clause. It may be the case that such errors were not found in the bi-DLD group because they do not use embedded noun clauses that require genitive case on the subject or case marking on the nominalized verb. The issue of complexity in relation to genitive marking in Turkish is also brought up by Acarlar and Johnston (2011), who found increased error rates with the genitive suffix in children with developmental delays. The observations in our study demonstrate the importance of considering the complexity of the construction if a suffix is obligatory: children with DLD may show a greater tendency to make errors with suffixes in simple constructions and avoid the more complex constructions altogether in comparison to their TD peers.

## Effects of DLD on Dutch learned as the societal language

With this study, our aim was to enhance our understanding of the parallel development of Turkish learned as a heritage language and Dutch as a societal language. The second set of analyses was, therefore, focused on Dutch. Note that, in recent years, a handful of studies investigated the impact of DLD on Dutch grammatical development in bilingual children of Turkish descent (Orgassa and Weerman, 2008; Verhoeven et al., 2011; Blom et al., 2013; Marinis et al., 2017), and one study reported on both Turkish and Dutch language outcomes (Verhoeven et al., 2012), but none of these studies analyzed semi-spontaneous speech or performed longitudinal analyses. The results of the present study are not only insightful with respect to the dual language development of heritage language Turkish and societal language Dutch in children but are also important to determine whether results of previous research that were obtained using controlled and standardized procedures, are replicated in semi-spontaneous speech, and to establish developmental effects.

In Dutch, the bi-DLD children used shorter utterances than the bi-TD children, similar to what has been reported for comparisons of utterance length across younger monolingual Dutch children with and without DLD (Bol and Kuiken, 1988). Across the two groups, utterance length increased during the period of the study, pointing to an ongoing and steady development in Dutch. However, there was no statistical evidence indicating that the relative frequency of grammatical errors decreased over time. So, although sentence complexity increased, children did not appear to make fewer grammatical errors. Moreover, statistical analyses revealed no effect of group, suggesting that the relative frequency of grammatical errors did not differ across the bi-TD and bi-DLD group. While this seems surprising at first sight, and was not predicted beforehand, it is possible that the semi-spontaneous data that we analyzed may show less effect of DLD than data collected with standardized

instruments and experimental materials (as used in previous research), because children with DLD may have avoided constructions that they find difficult to use, which to some extent concurs with what we suggested for the complex genitive-possessive constructions in Turkish. Moreover, the children with DLD used short utterances, reducing the possibility of making errors.

However, while these explanations may contribute to understanding the absence of a difference, they may not provide a full explanation, as in Turkish, the relative frequency of grammatical errors did differ between the bi-TD and bi-DLD groups, even though the same method of data collection was used and the utterances of bi-DLD children were short. In Turkish, however, grammatical morpheme errors, which were most of the grammatical errors, comprised bound morphology, while in Dutch, many of the errors were made with free-standing grammatical morphemes, specifically determiners. Such errors are not a typical characteristic of DLD in West Germanic languages (Leonard, 2014) and are known to be prone to influences of language contact (Hinskens et al., 2021), impacting on language use of both bilingual children with DLD and TD.

The proportion of omissions of grammatical morphemes was higher for the bi-DLD children than the bi-TD children and, reversely, the proportion of substitutions of grammatical morphemes was higher for the bi-TD than the bi-DLD group. A significant interaction effect revealed that the difference between the two groups in types of errors became smaller over the course of the study. The observation that children with DLD tend to omit grammatical morphemes in Dutch confirms patterns found in previous research on monolinguals (Blom et al., 2014b, 2015) and bilinguals (Verhoeven et al., 2011; Boerma, et al., 2017). Regarding the domain of errors with grammatical morphemes, the bi-DLD children made more errors in the verbal domain compared to the nominal domain, as expected and in line with previous research that identified verbs as a problem area in Dutch DLD (de Jong, 1999; Wexler et al., 2004).

In addition to quantitative analyses, we also analyzed errors with Dutch grammatical morphemes qualitatively, both comparing the bi-DLD and bi-TD groups with each other, as well as with monolingual Dutch control groups. In the nominal domain, children made most errors with determiners and pronouns, which are both free-standing grammatical morphemes in Dutch. In bilingual and monolingual contexts, no clear pattern emerged that distinguished the errors of children with DLD from those of children with TD. The verbal domain, in contrast, showed quite pronounced differences between the bi-DLD and bi-TD group, which may be related to the fact that there is more bound morphology in the verbal than in the nominal domain. Bi-DLD children used more utterances in which tense and agreement marking was absent and they omitted participial affixes more often compared to bi-TD children, which reflects grammatical limitations. A different picture emerged from the bi-TD sample, where overregularization of irregular agreement, tense and participles reflected productive knowledge of grammatical rules. Highly similar patterns were found when comparing the distribution of errors across the mo-DLD and mo-TD groups, indicating that the types of errors were more strongly impacted by DLD than bilingualism. Moreover, the patterns are consistent with previous research showing that, in Dutch, DLD is manifested in omission of agreement and tense (de Jong, 1999; Wexler et al., 2004; Verhoeven et al., 2011; Blom et al., 2013, 2014b) and participial affixes (Boerma, 2017). Limited overregularization in children with DLD has been reported previously for English (Oetting and Horohov, 1997; Redmond and Rice, 2001; Van der Lely and Ullman, 2001; Blom and Paradis, 2013). The results of our study indicate that this observation generalizes to Dutch.

## Bilingual assessment and (semi-)spontaneous speech

Analysis of (semi-)spontaneous speech, as used in the current study, could be relevant in clinical practice in situations where no standardized instruments are available, as is often the case in bilingual assessment. Spontaneous speech samples provide rich and ecologically valid data and provide a broad insight into children's linguistic behavior. However, analyses are also limited by what children produce spontaneously. In the case of DLD specifically, utterance length can be short, children may use reduced, simple sentences and avoid more complex structures, reducing the presence of clinical markers, that is, constructions that are likely to yield a high proportion of errors in DLD (Rice and Wexler, 1996). Also, the focus on specific clinical markers may be less useful in spontaneous speech analysis because the open procedure results in a wide range of errors, which broadens and to some extent corrects the (limited) view offered by clinical marker analyses.

However, using the outcomes of analysis of (semi-)spontaneous speech, screening instruments and diagnostic instruments can be developed that target clinical markers. The outcomes of the current study support the claim that bound grammatical morphology in the nominal domain for Turkish and in the verbal domain for Dutch is a promising clinical marker that characterizes DLD, irrespective of bilingualism (Blom et al., 2015; Boerma, 2017). This insight could be used to improve existing language assessment instruments. For example, the Dutch sentence repetition task that is part of the *Taaltoets Alle Kinderen* "Language Assessment for All Children" (TAK; Verhoeven and Vermeer, 2001) focuses on children's correct repetition of specific free-standing grammatical morphemes and word order patterns. A focus on bound grammatical morphology could result in a more sensitive instrument. The word formation task that is part of the same language assessment battery focuses on bound regular

and irregular grammatical morphology in the nominal and verbal domain. However, the outcomes of our study suggest that bound grammatical morphology in the nominal domain may have limited added value (see also: Boerma, 2017), and the same may be true for irregular forms, unless, perhaps, amount of overregularization is considered. In addition, the word formation task focuses on inherent morphology (plural marking on nouns, participle marking on verbs), while contextual morphology, in particular agreement marking in the verbal domain, constitutes an area of difficulty for children with DLD who are learning Dutch (de Jong, 1999; Verhoeven et al., 2011; Blom et al., 2013, 2014b).

## Limitations of the study

The longitudinal design, matching of children on background variables, and combination of quantitative and qualitative analyses are important strengths of the study. The conclusions of this study are, however, also limited in several respects. The study would have benefitted from a monolingual Turkish control group to measure the difference between Turkish as a heritage language and a societal language. Moreover, one child with DLD hardly used any Turkish at the first wave. Finally, analysis of (semi-)spontaneous speech provides rich and ecologically valid data, but the speech samples in this study are brief. Larger corpora provide more reliable conclusions, but an increase of corpus size is costly. Automatic transcription and morphosyntactic coding could be solutions, but these options are not yet available for child language research. In addition, although spontaneous speech data are potentially rich, analyses can be limited by the tendency of children with DLD to produce short and simple sentences. The current study was focused on grammatical errors as potential clinical markers. For this reason, we restricted measures of grammatical complexity to MLU. However, because correctness and complexity are both relevant for DLD, future research should include several measures of grammatical complexity, beyond MLU (Tuller et al., 2012).

# Conclusions

Cross-linguistic comparisons of error types in Turkish and Dutch confirm that, regardless of typological differences, children with DLD avoid complex constructions, use short sentences, and omit grammatical morphemes. Because complexity and omissions refer to different phenomena in the two languages, investigating the heritage language is of added value and can inform clinical diagnosis. In the case of Turkish spoken in the Netherlands, short sentences, and omission of possessive marking in simple genitive-possessive constructions could be markers of DLD. Although omission and substitution of accusative case are relatively frequent in bilingual Turkish-Dutch children with DLD, correct use of accusative case is less promising as a clinical marker because omission and substitution of accusative case can be part of the input to Turkish heritage language learners. In Dutch, frequent omission of grammatical morphemes in the verbal domain coupled with a limited amount of overregularization errors could indicate that a child is at risk of DLD, both in bilingual and monolingual contexts. These are also aspects that could inform assessment in only Dutch, if assessment in both languages is not possible. Longitudinal analyses revealed that children with DLD can develop the heritage language and do so at the same pace as children with typical development, even if this language is not supported at school. Strong intergenerational transmission and heritage language maintenance among Turkish migrants in the Netherlands may be key.

# Data availability statement

The datasets presented in this study can be found in online repositories. The names of the repository/repositories and accession number(s) can be found at: https://osf.io/3z2sj/.

# Ethics statement

The studies involving human participants were reviewed and approved by Ethics Review Board of the Faculty of Social and Behavioral Sciences (FERB) at Utrecht University. Written informed consent to participate in this study was provided by the participants' legal guardian/next of kin.

# Author contributions

Conceptualization: EB, TB, and JJ. Writing—original draft and funding acquisition: EB. Writing—review and editing and methodology: EB, TB, JJ, FK, and AK. Investigation: TB. Formal analysis and visualization: EB and FK. All authors contributed to the article and approved the submitted version.

# Funding

This work was supported by a Vidi Grant #276-70-023 awarded to EB by the Netherlands Organization for Scientific Research (NWO).

# Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships

that could be construed as a potential conflict of interest.

## Publisher's note

All claims expressed in this article are solely those of the authors and do not necessarily represent those of their affiliated organizations, or those of the publisher, the editors and the reviewers. Any product that may be evaluated in this article, or claim that may be made by its manufacturer, is not guaranteed or endorsed by the publisher.

## Supplementary material

The Supplementary Material for this article can be found online at: https://www.frontiersin.org/articles/10.3389/fcomm.2022.1059427/full#supplementary-material

## References


Acarlar, F., and Johnston, J. R. (2006). Computer-based analysis of Turkish child language: clinical and research applications. *J. Multiling. Commun. Disord.* 4, 78–94. doi: 10.1080/14769670600704821

Acarlar, F., and Johnston, J. R. (2011). Acquisition of Turkish grammatical morphology by children with developmental disorders. *Int. J. Lang. Commun. Disord.* 46, 728–738. doi: 10.1111/j.1460-6984.2011.00035.x

Akoğlu, G., and Yağmur, K. (2016). First-language skills of bilingual Turkish immigrant children growing up in a Dutch submersion context. *Int. J. Biling. Educ. Biling.* 19, 706–721. doi: 10.1080/13670050.2016.1181605

American Speech-Language-Hearing Association (2022). *Bilingual Service Delivery (Practice Portal)*. Available online at: https://www.asha.org/practice-portal/professional-issues/bilingual-service-delivery/#collapse_4 (accessed November 24, 2022).

Backus, A., and Yağmur, K. (2017). Differences in pragmatic skills between bilingual Turkish immigrant children in the Netherlands and monolingual peers. *The International Journal of Bilingualism: Cross-Disciplinary, Cross-Linguistic Studies of Language Behavior.* 23, 817–830. doi: 10.1177/1367006917703455

Bates, D., Maechler, M., Bolker, B., and Walker, S. (2015). Fitting linear mixed-effects models using lme4. *J. Stat. Softw.* 67, 1–48. doi: 10.18637/jss.v067.i01

Bialystok, E., Craik, F. I., and Luk, G. (2012). Bilingualism: consequences for mind and brain. *Trends Cogn. Sci.* 16, 240–250. doi: 10.1016/j.tics.2012.03.001

Blom, E., and Boerma, T. D. (2016). Effects of language impairment and bilingualism across domains: vocabulary, morphology and verbal memory. *Linguist. Approaches Biling.* 7, 2773200. doi: 10.1075/lab.15018.blo

Blom, E., Boerma, T. D., and de Jong, J. (2019). "First language attrition and developmental language disorder." in *The Oxford Handbook of Language Attrition,* Eds, M. S. Schmid and B. Köpke (Oxford University Press), 108–120.

Blom, E., de Jong, J., Orgassa, A., Baker, A. E., and Weerman, F. P. (2013). Verb inflection in monolingual Dutch and sequential bilingual Turkish-Dutch children with and without SLI. *Int. J. Lang. Commun. Disord.* 48, 382–393. doi: 10.1111/1460-6984.12013

Blom, E., Küntay, A. C., Messer, M., Verhagen, J., and Leseman, P. (2014a). The benefits of being bilingual: working memory in bilingual Turkish–Dutch children. *J. Exp. Child Psychol.* 128, 105–119. doi: 10.1016/j.jecp.2014.06.007

Blom, E., and Paradis, J. (2013). Past tense production by English second language learners with and without language impairment. *J. Speech Lang. Hear. Res.* 56, 281–294. doi: 10.1044/1092-4388(2012/11-0112)

Blom, E., Vasić, N., and Baker, A. (2015). The pragmatics of articles in Dutch children with specific language impairment. *Lingua.* 155, 29–42. doi: 10.1016/j.lingua.2013.12.002

Blom, E., Vasić, N., and de Jong, J. (2014b). Production and processing of subject-verb agreement in monolingual Dutch children with specific language impairment. *J. Speech Lang. Hear. Res.* 57, 952–965. doi: 10.1044/2014_JSLHR-L-13-0104

Boerma, T. D. (2017). *Profiles and paths: effects of language impairment and bilingualism on children's linguistic and cognitive development* [Doctoral Dissertation, Utrecht University] Utrecht University Repository. Available online at: https://dspace.library.uu.nl/handle/1874/356269

Boerma, T. D., Wijnen, F., Leseman, P. P. M., and Blom, E. (2017). Grammatical morphology in monolingual and bilingual children with and without language impairment: the case of Dutch plurals and past participles. *J. Speech Lang. Hear. Res.* 60, 2064–2080. doi: 10.1044/2017_JSLHR-L-16-0351

Boeschoten, H. E. (1990). *Acquisition of Turkish by immigrant children: a multiple case study of Turkish children in the Netherlands aged 4 to 6.* [Doctoral Dissertation, Tilburg University] Tilburg University Research Portal. Available online at: https://research.tilburguniversity.edu/en/publications/acquisition-of-turkish-by-immigrant-children-a-multiple-case-stud

Bol, G. W., and Kuiken, F. (1988). *Grammaticale analyse van taalontwikkelingsstoornissen* (Publication No. 304236) [Doctoral Dissertation, University of Amsterdam].

Booij, G. (2002). *The Morphology of Dutch*. Oxford: Oxford University Press.

Booij, G. E. (2006). "Inflection and derivation." in: *Encyclopedia of Language and Linguistics*, Eds K. Brown (New York: Elsevier), 654–661. doi: 10.1016/B0-08-044854-2/00115-2

Cabo, D. P. Y. (2012). The (il)logical problem of heritage speaker bilingualism and incomplete acquisition. *Appl. Linguist.* 33, 450–455. doi: 10.1093/applin/ams037

Clahsen, H., Bartke, S., and Göllner, S. (1997). Formal features in impaired grammars: a comparison of English and German SLI children. *J. Neurolinguistics.* 10, 151–171. doi: 10.1016/S0911-6044(97)00006-7

Cornips, L., and Hulk, A. (2008). Factors of success and failure in the acquisition of grammatical gender in Dutch. *Second Lang. Res.* 24, 267–295. doi: 10.1177/0267658308090182

De Houwer, A. (2007). Parental language input patterns and children's bilingual use. *Applied Psycholinguistics.* 28, 411–424. doi: 10.1017/S0142716407070221

de Jong, J. (1999). *Specific language impairment in Dutch: Inflectional morphology and argument structure.* [Doctoral Dissertation, University of Groningen] University of Groningen research portal. Available online at: https://research.rug.nl/en/publications/specific-language-impairment-in-dutch-inflectional-morphology-and

de Jong, J., Çavus, N., and Baker, A. (2010). Language impairment in Turkish-Dutch bilingual children. *Communication disorders in Turkish* (Bristol: Multilingual Matters), 288–300. doi: 10.21832/9781847692474-018

Doğruöz, A. S., and Backus, A. (2009). Innovative constructions in Dutch Turkish: an assessment of ongoing contact-induced change. *Bilingualism.* 12, 41–63. doi: 10.1017/S1366728908003441

Dromi, E., Leonard, L. B., Adam, G., and Zadunaisky-Ehrlich, S. (1999). Verb agreement morphology in Hebrew-speaking children with specific language impairment. *J. Speech Lang. Hear. Res.* 42, 1414–1431. doi: 10.1044/jslhr.4206.1414

Extra, G., Aarts, R., van der Avoird, T., Broeder, P., and Yağmur, K. (2002). *De andere talen van Nederland: thuis en op school*. Coutinho.

Extra, G., and Yağmur, K. (2010). Language proficiency and socio-cultural orientation of Turkish and Moroccan youngsters in the Netherlands. *Language and Education.* 24, 117–132. doi: 10.1080/09500780903096561

Gagarina, N. V., Klop, D., Kunnari, S., Tantele, K., Välimaa, T., Balčiūnienė, I., et al. (2012). *MAIN: Multilingual assessment instrument for narratives*. Berlin: Zentrum für Allgemeine Sprachwissenschaft.

Gillam, R. B., Montgomery, J. W., Evans, J. L., and Gillam, S. L. (2019). Cognitive predictors of sentence comprehension in children with and without developmental language disorder: implications for assessment and treatment. *Int. J. Speech Lang. Pathol.* 21, 240–251. doi: 10.1080/17549507.2018.1559883

Göksel, A., and Kerslake, C. (2005). *Turkish: A comprehensive grammar (1st ed.)*. London: Routledge. doi: 10.4324/9780203340769

Gray, S. (2003). Diagnostic accuracy and test–retest reliability of nonword repetition and digit span tasks administered to preschool children with specific language impairment. *J. Commun. Disord.* 36, 129–151. doi: 10.1016/S0021-9924(03)00003-0

Güven, S., and Leonard, L. B. (2020), Production of noun suffixes by Turkish-speaking children with developmental language disorder and their typically developing peers. *Int. J. Lang. Commun. Disord.* 55, 387–400. doi: 10.1111/1460-6984.12525

Güven, S., and Leonard, L. B. (2021). Verb morphology in Turkish-speaking children with and without DLD: the role of morphophonology. *Clin. Linguist. Phon.* 1–25. doi: 10.1080/02699206.2021.2012836

Haeseryn, W., Romijn, K., Geerts, G., Rooij, J. D., and Van den Toorn, M. C. (1997). *Algemene Nederlandse Spraakkunst 2*. Groningen: Martinus Nijhoff.

Hinskens, F. L. M. P., van Hout, R., Muysken, P. C., and van Wijngaarden, R. P. A. (2021). Variation and change in grammatical gender marking: The case of Dutch ethnolects. *Linguistics.* 59, 75–100. doi: 10.1515/ling-2020-0265

Hoff, E. (2018). Bilingual development in children of immigrant families. *Child Dev. Perspect.* 12, 80–86. doi: 10.1111/cdep.12262

Ionin, T. (2013). "Morphosyntax." in: *The Cambridge Handbook of Second Language Acquisition, Cambridge Handbooks in Language and Linguistics,* Eds. J. Herschensohn and M. Young-Scholten (Cambridge: Cambridge University Press, 505–528.

Kohnert, K. (2010). Bilingual children with primary language impairment: issues, evidence and implications for clinical actions. *J. Commun. Disord.* 43, 456–473. doi: 10.1016/j.jcomdis.2010.02.002

Kornfilt, J. (1997). *Turkish*. London: Routledge.

Kuiken, F., and Van der Linden, E. (2013). Language policy and language education in the Netherlands and Romania. *Dutch J. Appl. Linguist.* 2, 205–223. doi: 10.1075/dujal.2.2.06kui

Leonard, L. B. (2014). Specific language impairment across languages. *Child Dev. Perspect.* 8, 1–5. doi: 10.1111/cdep.12053

Leonard, L. B., Kunnari, S., Savinainen-Makkonen, T., Tolonen, A., Mäkinen, L., Luotonen, M., et al. (2014). Noun case suffix use by children with specific language impairment: an examination of Finnish. *Appl. Psycholinguist.* 35, 833–854. doi: 10.1017/S0142716412000598

Lukács, A., Leonard, L. B., and Kas, B. (2010). Use of noun morphology by children with language impairment: the case of Hungarian. *Int. J. Lang. Commun. Disord.* 45, 145–161. doi: 10.3109/13682820902781060

Lukács, A., Leonard, L. B., Kas, B., and Pleh, C. (2009). The use of tense and agreement by Hungarian-speaking children with language impairment. *J. Speech Lang. Hear. Res.* 52, 98–117. doi: 10.1044/1092-4388(2008/07-0183)

MacRoy-Higgins, M., and Dalton, K. P. (2015). The influence of phonotactic probability on nonword repetition and fast mapping in 3-year-olds with a history of expressive language delay. *J. Speech Lang. Hear. Res.* 58, 1773–1779. doi: 10.1044/2015_JSLHR-L-15-0079

MacWhinney, B. (2000). *The Childes Project* (3rd ed.). London: Psychology Press.

Marinis, T., Chondrogianni, V., Vasic, N., Weerman, F., and Blom, E. (2017). The impact of transparency and morpho-phonological cues in the acquisition of grammatical gender in sequential bilingual children and children with specific language impairment: a cross-linguistic study. *Cross-linguistic influence in bilingualism: In honor of Aafke Hulk*. 153. doi: 10.1075/sibil.52.08mar

Mennen, I., and Stansfield, J. (2006). Speech and language therapy services to multilingual children in Scotland and England: a comparison of three cities. *J. Multiling. Commun. Disord.* 4, 23–44. doi: 10.1080/14769670500272689

Montrul, S. (2008). Second language acquisition welcomes the heritage language learner: opportunities of a new field. *Second Lang. Res.* 24, 487–506. doi: 10.1177/0267658308095738

Norbury, C. F., Gooch, D., Wray, C., Baird, G., Charman, T., Simonoff, E., et al. (2016). The impact of nonverbal ability on prevalence and clinical presentation of language disorder: evidence from a population study. *J. Child Psychol. Psychiatry.* 57, 1247–1257. doi: 10.1111/jcpp.12573

Oetting, J. B., and Horohov, J. E. (1997). Past-tense marking by children with and without specific language impairment. *J. Speech Lang. Hear. Res.* 40, 62–74. doi: 10.1044/jslhr.4001.62

Orgassa, A., and Weerman, F. (2008). Dutch gender in specific language impairment and second language acquisition. *Second Lang. Res.* 24, 333–364. doi: 10.1177/0267658308090184

R Core Team. (2016). *R: A language and environment for statistical computing*. R Foundation for Statistical Computing, Vienna, Austria. Available online at: https://www.R-project.org/

Redmond, S. M., and Rice, M. L. (2001). Detection of irregular verb violations by children with and without SLI. *J. Speech Lang. Hear. Res.* 44, 655–669. doi: 10.1044/1092-4388(2001/053)

Reep-van den Bergh, C. M. M., de Koning, H. J., de Ridder-Sluiter, J. G., van de Lem, G. J., and van der Maas, P. J. (1998). Prevalentie van taalontwikkelingsstoornissen bij kinderen. *Tijdschrift voor Gezondheidswetenschappen.* 76, 311–317.

Restrepo, M. A., Castilla, A. P., Schwanenflugel, P. J., Neuharth-Pritchett, S., Hamilton, C. E., and Arboleda, A. (2010). Effects of a supplemental Spanish oral language program on sentence length, complexity, and grammaticality in Spanish-speaking children attending English-only preschools. *Language, Speech and Hearing Services in Schools.* 41, 3–13. doi: 10.1044/0161-1461(2009/06-0017)

Restrepo, M. A., and Kruth, K. (2000). Grammatical characteristics of a Spanish-English bilingual child with specific language impairment. *Commun. Disord. Q.* 21, 66–76. doi: 10.1177/152574010002100201

Rice, M. L. (2013). Language growth and genetics of specific language impairment. *Int. J. Speech Lang. Pathol.* 15, 223–233. doi: 10.3109/17549507.2013.783113

Rice, M. L., Buhr, J., and Oetting, J. B. (1992). Specific-language-impaired children's quick incidental learning of words: the effect of a pause. *J. Speech Hear. Res.* 35, 1040–1048. doi: 10.1044/jshr.3505.1040

Rice, M. L., Noll, K. R., and Grimm, H. (1997). An extended optional infinitive stage in german-speaking children with specific language impairment. *Lang. Acquis.* 6, 255–295. doi: 10.1207/s15327817la0604_1

Rice, M. L., and Wexler, K. (1996). Toward tense as a clinical marker of specific language impairment in English-speaking children. *J. Speech Lang. Hear. Res.* 39, 1239–1257. doi: 10.1044/jshr.3906.1239

Rispens, J. E., and De Bree, E. H. (2014). Past tense productivity in Dutch children with and without SLI: the role of morphophonology and frequency. *J. Child Lang.* 41, 200–225. doi: 10.1017/S0305000912000542

Rothweiler, M., Chilla, S., and Babur, E. (2010). Specific language impairment in Turkish: evidence from case morphology in Turkish-German successive bilinguals. *Clin. Linguist. Phon.* 24, 540–555. doi: 10.3109/02699200903545328

Stichting Siméa. (2014). *Indicatiecriteria: auditief en/of communicatief beperkte leerlingen*. Available online at: https://simea.nl/dossiers/passend-onderwijs/brochures-po/simea-brochure%20indicatiecriteria-juni-2014.pdf

Tomblin, J. B., Records, N. L., Buckwalter, P., Zhang, X., Smith, E., and O'Brien, M. (1997). Prevalence of specific language impairment in kindergarten children. *J. Speech Lang. Hear. Res.* 40, 1245–1260. doi: 10.1044/jslhr.4006.1245

Topbaş, S., Bulut, T., and Günhan, N. E. (2019). "Turkey." in *Managing Children with Developmental Language Disorder: Theory and Practice Across Europe and Beyond*, Eds J. Law, C. McKean, C. A. Murphy and E. Thordardottir (London: Routledge), 365–377.

Topbaş, S., Güven, S., Uysal, A. A., and Kazanoglu, D. (2016). "Language impairment in Turkish-speaking children: the nature of morphological errors." in *The acquisition of Turkish in childhood*, Eds B. Haznedar and N. Ketrez (Amsterdam/Philadelphia: Benjamins), 295–324. doi: 10.1075/tilar.20.13top

Topbaş, S., and Yavas, M. (2010). *Communication disorders in Turkish (1st ed.)*. Bristol: Multilingual Matters. doi: 10.21832/9781847692474

Tuller, L. (2015). "Clinical use of parental questionnaires in multilingual contexts," in *Methods for Assessing Multilingual Children: Disentangling Bilingualism From Language Impairment*, eds S. Armon-Lotem, J. de Jong, and N. Meir (Bristol: Multilingual Matters), 301–330.

Tuller, L., Henry, C., Sizaret, E., and Barthez, M.-A. (2012). Specific language impairment at adolescence: avoiding complexity. *Appl. Psycholinguist. 33*, 161–184. doi: 10.1017/S0142716411000312

Valdés, G. (2000). "The teaching of heritage languages: an introduction for Slavic-teaching professionals." in *The Learning and Teaching of Slavic Languages and Cultures: Toward the 21st Century*, Eds O. Kagan, and B. Rifkin (Bloomington, IN: Slavica), 375–403.

Van der Lely, H. K. J., and Ullman, M. T. (2001). Past tense morphology in specifically language impaired and normally developing children. *Lang. Cogn. Process.* 16, 177–217. doi: 10.1080/01690960042000076

Verhoeven, L., Steenge, J., and van Balkom, H. (2012), Linguistic transfer in bilingual children with specific language impairment. *Int. J. Lang. Commun. Disord.* 47, 176–183. doi: 10.1111/j.1460-6984.2011.00092.x

Verhoeven, L. T. W., Steenge, J., and van Balkom, H. (2011). Verb morphology as clinical marker of specific language impairment: evidence from first and second language learners. *Res. Dev. Disabil.* 32, 1186–1193. doi: 10.1016/j.ridd.2011.01.001

Verhoeven, L. T. W., and Vermeer, A. (2001). Taaltoets alle kinderen. diagnostische toets voor de mondelinge vaardigheid Nederlands bij kinderen van groep 1 tot en met 4. Arhem: Citogroep.

Weismer, S. E., Venker, C. E., Evans, J. L., and Moyle, M. J. (2013). Fast mapping in late-talking toddlers. *Appl. Psycholinguist.* 34, 69–89. doi: 10.1017/S0142716411000610

Wexler, K., Schaeffer, J., and Bol, G. W. (2004). Verbal syntax and morphology in typically developing Dutch children and children with SLI: how developmental data can play an important role in morphological theory. *Syntax.* 7, 148–198. doi: 10.1111/j.1467-9612.2004.00006.x

Zwitserlood, R. L. M., Weerdenburg, M. W. C., van, Verhoeven, L. T. W., and Wijnen, F. N. K. (2015). Development of morphosyntactic accuracy and grammatical complexity in Dutch school-age children with SLI. *J. Speech Lang. Hear. Res.* 58, 891–905. doi: 10.1044/2015_JSLHR-L-14-0015

frontiers | Frontiers in Psychology

TYPE Original Research
PUBLISHED 06 January 2023
DOI 10.3389/fpsyg.2022.1083813



OPEN ACCESS

EDITED BY
He Sun,
Nanyang Technological University,
Singapore

REVIEWED BY
Abdulghani Muthanna,
Norwegian University of Science and Technology, Norway
Rufan Luo,
Arizona State University,
United States

*CORRESPONDENCE
Chunxuan Shen
✉ c.shen1@uq.edu.au

SPECIALTY SECTION
This article was submitted to Language Sciences, a section of the journal Frontiers in Psychology

RECEIVED 29 October 2022
ACCEPTED 16 December 2022
PUBLISHED 06 January 2023

CITATION
Shen C and Jiang W (2023) Parents' planning, children's agency and heritage language education: Re-storying the language experiences of three Chinese immigrant families in Australia. *Front. Psychol.* 13:1083813. doi: 10.3389/fpsyg.2022.1083813



# Parents' planning, children's agency and heritage language education: Re-storying the language experiences of three Chinese immigrant families in Australia

Chunxuan Shen[1,2]* and Wenying Jiang[2]

[1]Zhejiang Gongshang University Hangzhou College of Commerce, Hangzhou, Zhejiang, China, [2]School of Languages and Cultures, The University of Queensland, Brisbane, QLD, Australia

This study delves into the heritage language experiences of Australian-born Chinese immigrant children under the framework of family language policy. Storytelling as a narrative inquiry method is used to reveal the lived experiences of the protagonists in relation to heritage language and culture. The three family stories involved for case studies reveal different levels of parent agency in Chinese immigrant families regarding their children's home language use and heritage language education. It is noted that the level of child agency corresponds with the level of their parent agency. Where parents strongly advocate and practice heritage language maintenance, stronger agency is observed in their children to continue the use and learning of their heritage language. In addition, maintaining harmony while parents are implementing family language policies and providing children with formal instruction in heritage language are conducive to heritage language development, particularly in terms of its literacy.

KEYWORDS

**family language policy, heritage language, parent agency, child agency, Chinese immigrant families**

## 1. Introduction

Drawing on three family stories, this study presents the findings of an ethnographic study on family language policy (FLP) in Chinese immigrant families in Brisbane, Australia. The paramount importance of family to the transmission of heritage language (HL) and culture has been acknowledged by a large number of researchers in recent decades (Tannenbaum and Howie, 2002; King et al., 2008; Fogle and King, 2013; Revis, 2019; Curdt-Christiansen and Huang, 2020; Wilson, 2020, etc.). Australia is a multilingual and multicultural country with "a strong and sustained history of immigration" (Collins, 2013, p. 134), which offers extensive opportunities for FLP research. Among all languages other

than English (LOTE[1]) spoken in Australian households, Mandarin ranks first in the past Australian Censuses (Australian Bureau of Statistics, 2017). An in-depth investigation of how Mandarin is maintained in Chinese immigrant families may provide insights into the conundrum of reversing language shift for many other Australian community languages. Tannenbaum (2003, p. 374) advocates that the second-generation immigrants who were born and raised in Australia are the "transition generation" that hold the key to whether their HLs will be maintained or lost. This study is devoted to revealing a nuanced picture of FLPs in the three families and focalizing the critical role of parents' planning and child agency in the enactment of FLPs. Agency, i.e., an individual's "socioculturally mediated capacity to act" (Ahearn, 2001, p. 112), has received increasing scholarly attention in FLP studies. Parental agency, according to King et al. (2008), includes parents' ideology, practice and management strategies in relation to HL, which, to a large extent, impacts children's HL use and learning outcomes. Concomitantly, a growing body of research has recently highlighted the role of child agency in implementing, negotiating and adjusting FLPs (e.g., Fogle and King, 2013; Curdt-Christiansen and Huang, 2020; Smith-Christmas, 2020, 2022). Fogle and King (2013) argued that children could act as powerful agents in FLPs by making metalinguistic comments about language rules, using strategies to negotiate parental practices, or influencing parental responses to their developing bilingual/multilingual competence. Their research, therefore, makes an urgent call for more scholarly attention to be placed on the role of children in FLP studies.

## 2. Definition of heritage language learners

Heritage language learning has long been recognized as a topic of significance in bilingual research. The term "heritage language" is often employed to denote a socio-politically minority language acquired by children in the home environment either as a first language since birth or developed simultaneously with a dominant language of a larger society (Montrul, 2018). It is also called "home language," "family language," "minority language," "maternal heritage language," "mother tongue" or "community language" by different researchers (Clyne and Kipp, 2006; Montrul, 2018; Sun, 2019; Curdt-Christiansen and Huang, 2020; Smith-Christmas, 2020; Sun et al., 2022). These terms denote its "particular family relevance" (Fishman, 2001, p. 169), "heritage connection to the language" (Cummins, 2005, p. 586), parental influence (Sun, 2019) and its weaker status as opposed to the majority language in the society (Clyne and Kipp, 2006). Therefore, the acquisition of HL heavily relies on home language environment, parents' HL proficiency and use, as well as community and educational support (Sun et al., 2020, 2022).

Due to the quantity and quality of HL input and a variety of internal and external factors (Sun et al., 2020), HL learners' proficiency in HL may vary greatly from a very basic level of understanding daily home communication to a full and literate proficiency in both HL and the dominant language of the society (Gibbons and Ramirez, 2004; Hayakawa et al., 2022). Given the wide range of HL proficiency, some scholars also defined HL learners from the angle of agency instead of their competency or proficiency in HL. For instance, in Hornberger and Wang's (2008) definition, HL learners are "individuals with familial or ancestral ties to a language other than English who exert their agency in determining if they are heritage language learners of that language" (p. 6). Their definition places more emphasis on the learners' initiatives, self-positioning and self-negotiation in identifying whether they belong to HL learners.

## 3. Earlier research on FLP

Family language policy has been defined as "explicit and overt planning in relation to language use within the home among family members" (King et al., 2008, p. 907), integrating theory and data from the fields of language policy and child language acquisition (Fogle and King, 2013). The most cited model in FLP studies is Spolsky's (2004, 2009, 2012, 2019) tripartite model, which comprises language ideology, language practice and language management. Language practice refers to how family members habitually interact with each other verbally, i.e., what choice they make from their linguistic repertoire. Language management is conceptualized as specific efforts or strategies parents use to modify or influence their language practice. Underlying these two components are language beliefs, also called language ideology, about operating language practice and language management efforts. This model sets a framework for research on parent–child interactions in immigrant families and child language development (Fogle and King, 2013).

Earlier FLP research highlighted parental perspectives, agency, decision-making and management of HL (King et al., 2008; Curdt-Christiansen, 2009; Kang, 2015). As the child caregiver, the parents usually make decisions and act as a model for the children in language use (Park and Sarkar, 2007; Chatzidaki and Maligkoudi, 2013; Zhu and Li, 2016; Shen, 2017). Parents' language attitudes, cultural dispositions, language practices and strategies largely determine whether HL can be maintained in the younger generation (Park and Sarkar, 2007; Szecsi and Szilagyi, 2012; Shen and Jiang, 2021). The shift away from HL is more common in families with little-to-no overt planning by immigrant parents (Fogle and King, 2013).

These policies and practices, however, are neither static nor unidirectional. The critical role of children in shaping and reshaping parents' FLPs has aroused scholarly interest (Fogle and

1 LOTE was employed in the past Australian Censuses as an umbrella term for all languages other than English spoken in Australian households. The Australian Curriculum for Languages nominates LOTE as a compulsory language subject that requires a minimum of 350 h of study in primary years (from Foundation to Year 6) and 350 h in Years 7–10.

King, 2013; Said and Zhu, 2019; Wilson, 2020; Smith-Christmas, 2022, etc.). The children could either negotiate, contest or resist the explicit policy decisions implemented by the parents, which in turn impacts their FLPs (Boyd et al., 2017; Revis, 2019). The parents have the good intention to socialize their children into HL usage; however, how the children feel, experience and react is of no less importance than what the parents are trying to implement (Wilson, 2020). Curdt-Christiansen (2009, 2014) and Curdt-Christiansen and La Morgia (2018), therefore, further develop Spolsky's model of FLP by incorporating internal and external factors. Included internal factors are emotion, identity, family culture and tradition, parental impact belief and child agency (Curdt-Christiansen and Huang, 2020). Curdt-Christiansen and Huang (2020) defined child agency as "children's active role in making decisions about patterns of family language use" (p. 178). They argue that child agency is noticeable but complex between the two generations and thus should be treated with careful consideration.

## 4. Chinese language education in Australia

The maintenance of Chinese as an HL overseas is complicated by the diversity of Chinese language varieties. "Chinese" is an ambiguous label when used to refer to language. The Chinese language consists of seven major "dialects" (Taylor and Taylor, 2014) or "language varieties" (Wiley et al., 2008), which are usually mutually unintelligible orally but share the same written form using Chinese characters (Li, 1994). Of the seven major "dialects," Mandarin is the one with official status and the largest number of speakers in China. Apart from Mainland China, Mandarin is also officially used in Taiwan under the name of *Guoyu* ("national language") and in Singapore under the name of *Huayu* ("Chinese language") (Taylor and Taylor, 2014). Cantonese is referred to as a dialect within Mainland China, however, it is often referred to as "Chinese" language overseas. In this article, Mandarin and Chinese are used in an interchangeable manner referring to the official language used in China, Taiwan and Singapore.

In Australia, the number of Mandarin speakers has surpassed that of Cantonese speakers. The census statistics indicate that in 2011, the percentage of Australians speaking Mandarin at home is 1.6%, slightly higher than 1.2% of Australians who speak Cantonese. By 2016, among the Chinese Australians who make up 5.6% of the nation's whole population, the number of Mandarin speakers (596,711) is more than twice the number of Cantonese speakers (280,943) (Australian Bureau of Statistics, 2017). Released in the most recent 2021 Australian Census, Mandarin continues to be the most spoken language other than English (685, 274), while Cantonese has been overtaken by Vietnamese (Australian Bureau of Statistics, 2022).

With the fast-growing Mandarin-speaking community, Mandarin has also been included nationwide as part of the Australian school curriculum, being placed among the top priority LOTEs (Australian Curriculum, Assessment and Reporting Authority, 2016). In the meantime, community language schools flourish in Australia, which greatly contributes to the maintenance of immigrants' HLs and cultures. Each state is providing grants to these community language schools in support of their operations. By 2020, there have been nearly 100 Chinese (Mandarin) community language schools across Australia (Department of Education, Skills and Employment, 2021). This means that Australian-born Chinese have the opportunity to receive formal instructions in Mandarin *via* school language programs, community language schools or both. Considering the Chinese heritage background of this study, the researchers use weekend Chinese language schools when discussing community language schools in this article because they usually operate on both Saturdays and/or Sundays.

Despite these language opportunities both at the familial and institutional levels, language shift is still evident for second-generation Chinese immigrants according to previous studies, particularly in the area of the second generation's literacy abilities (Clyne and Kipp, 1999, 2006; Chen, 2013; Hu et al., 2014; Shen and Jiang, 2021, etc.). Reading or writing in HL may resist language shift longer than merely a conversational level of HL for daily communication; however, full and literate proficiency in HL is difficult to achieve, particularly when HL differs so greatly from the socially dominant language. Adopting an ethnographic approach to three Chinese immigrant families, this study attempts to explore the FLPs upheld in these families, re-story the bilingual experiences of the Australian-born generation and provide implications for heritage language and cultural maintenance for a wider community. The specific research questions to be addressed are: (1) What FLPs were practiced by the parents in these three families? What are the differences among them? (2) How were the children responding and reacting to their parents' FLPs? (3) What were their HL learning outcomes?

## 5. Research methodology

To gain an in-depth understanding of the abovementioned research questions, substantial fieldwork has been conducted in a Chinese community in Australia with qualitative data collection methods employed. The research methods are specified as follows:

### 5.1. Storytelling as a narrative inquiry method

Telling stories is a crucial qualitative approach to language research that provides a rich source of knowledge and meaning making (Dwyer and Emerald, 2017). Clandinin and Rosiek (2007) believe that the stories lived and told fill our world with meaning and help us build connections between each other in lives and communities. People's daily lives are shaped by stories of who they

and others are while they are recalling and interpreting their past in these stories (Connelly and Clandinin, 2006).

The telling of stories is a narrative reproduction of chronologically connected events of spoken or written texts relating to the significant lived experiences of the individuals who instill meaning in the world (Merriam and Tisdell, 2016; Nasheeda et al., 2019, etc.). Recognized as a unique type of narrative inquiry, storytelling emphasizes collaboration and engagement between researcher and participant to retell the participant's past and present realities (Clandinin and Connelly, 2000). In narrative research, the process of crafting a story of the participant should involve a complex set of strategies and truthfully reflect the actions, choices and beliefs of the participant. It is also through this process that important clues about how individuals use their language(s) and engage in identity construction are revealed (Nasheeda et al., 2019).

## 5.2. Participants and ethnographic fieldwork

This study adopted an ethnographic approach to collect in-depth and multi-dimensional data from the participating families. It emphasizes an "emic or insider's point of view" and endeavors to derive meanings and understandings of data through their engagement in the field setting (Mills et al., 2010, p. 596). In ethnographic studies, the researchers' constant exposure to the community and sustained engagement with the participants are essential for understanding and interpreting what people actually do in their lives (Schensul et al., 2012). The ethnographic fieldwork for this study was conducted at a renowned weekend Chinese school in Brisbane, Australia. It is a non-profit community school specializing in teaching Chinese to children aged from 4 to 16 who are of various Chinese proficiency levels. Having been established over 15 years, the school is well known as the largest community-based weekend Chinese language school in Queensland. The fieldwork lasted for approximately 18 months, including 2 months' unstructured observation at the research site as preparation and 2 months' pilot study prior to data collection. During this course, the first author spent, on average, one day every weekend on the research site plus special days or festivals, where cultural events and performances were hosted by the weekend Chinese language school for all the learners and parents in its community. By doing this, the researchers aimed to gain a holistic view of what was happening on the research site and more insights into the participants' experiences.

The three families involved in this article were epitomes of the 30 families the researchers recruited for a larger project. All the participants were given a Participant Information Sheet, a Chinese version for parents and an English version for children. The parents were asked to sign a Participant Consent Form for themselves and a Guardian Consent Form for their participating child before the commencement of formal research procedures. The protagonists of the three family stories reported in this article, i.e., Leo, Tracy and Anne (all pseudonyms), were studied as three typical cases out of the 30 child participants in that project because they represented the high, medium and low levels of HL proficiency outcomes, respectively, as evidenced in an oral and written Chinese proficiency test (Shen, 2017; Shen and Jiang, 2021; Shen and Jiang, 2022).

Data were collected through two formal interviews, i.e., one parental interview (approximately 1 h) and one child's interview (approximately 40 min), family background information provided by the parents, and the notes taken by the researchers during the informal meetings with the participants. The formal interviews were semi-structured and targeted at eliciting in-depth information about the participants' perspectives and practices in regard to their (children's) language experiences. A list of 16 questions were pre-formulated as a guide for the interviews (see Appendices A, B), which involved a variety of sub-topics regarding FLPs, such as home language use, HL literacy practices, parents' expectations, ethnic identity and exposure to the HL and its culture. These topics were elicited from various similar studies in the literature (e.g., Lao, 2004; Park and Sarkar, 2007; Curdt-Christiansen, 2009; Zhang and Slaughter-Defoe, 2009; Hu et al., 2014). The majority of the questions were open-ended and aimed to guide the participants to report on their past experiences, stories and perceptions of various aspects of Chinese language maintenance.

In addition, the researchers had at least two informal interviews with each family before the formal interview so that sufficient familiarity and trust had been fostered before the formal interview started. The first author received the invitation from all the three families to visit their home, which demonstrated a trustworthy relationship between the researchers and the participants. Only one parent from each family was involved in the interviews, and coincidentally, all three parents who volunteered were mothers. The profile of the child participants and their parents' background information are presented in Tables 1, 2, respectively.

During interviews, all the parent participants selected Mandarin Chinese as their preferred language while all the child participants voluntarily chose English. Only the formal interviews were recorded and transcribed verbatim. The informal interviews were unstructured, giving participants more freedom and spontaneity to share their own stories and feelings. The summary of each informal interview and notes taken during the interviews were used as complementary data for constructing the protagonists' stories.

TABLE 1 Profile of the child participants.

| | School year level | Age | Birth country | Gender | Siblings |
|---|---|---|---|---|---|
| Leo | 5 | 11 | Australia | Male | 1 |
| Tracy | 5 | 11 | Australia | Female | 1 |
| Anne | 5 | 10 | Australia | Female | 0 |

TABLE 2 Profile of the parent participants.

| | Birth country | Hometown | Length of living in Australia |
|---|---|---|---|
| Jessica (Leo's mother) | China | Qingdao (north) | 15 years |
| Fiona (Tracy's mother) | China | Shanghai (southeast) | 20 years |
| Anne (Chloe's mother) | China | Guangzhou (south) | 15 years |

## 5.3. Constructing stories from the data

Stories need such essential elements as characters, settings, actions and experiences of an individual, which need to be recognized, analyzed and retold in chronological order (Clandinin and Connelly, 2000; Clandinin and Rosiek, 2007; Nasheeda et al., 2019, etc.). The current study extracted these elements from the fieldwork data, emplotted them and turned them into a coherent family story for each participant. Emplotment is crucial for crafting stories from interview transcripts (Czarniawska, 2004), through which a sense-making mechanism needs to be established on how all these elements are threaded into an organized and meaningful narrative. During this process, the four-phase progression as a multimethod approach to narrative analysis put forward by Nasheeda et al. (2019) was adopted comprising: (1) from interviews to transcripts; (2) storying the transcripts; (3) cocreating between the researcher and the participant; (4) meaning making. These four phases are briefly illustrated in Figure 1. By applying this approach, the study attempted to create a holistic story of the lived experiences of the participants while extracting the segments or episodes from the data.

Families have a shared repertoire of stories around language experiences. Parents and children not only have their collective lived language experiences but also their own individual experiences to draw on in their storytelling (Obojska and Purkarthofer, 2018). The researchers of this study, therefore, interviewed both parents and children. The process of retelling each family story from the data is not only a reflection of the familial language ideologies and language practices but also the individual family member's own experiences and feelings. To maintain objectivity and avoid researchers' bias, the stories reconstructed were all brought back to the participants to confirm whether the emplotment accurately reflected the participants' experiences and voice. The participants were requested to make corrections or additions where they disagreed.

# 6. Findings

The study reveals three distinct family stories with respect to the home language environment, parental language ideologies and practices as well as the children's experiences, feelings, and reactions. The three stories were presented in this section.

## 6.1. Leo's family story – "I am proud that I can speak Chinese"

Leo was a Year-5 student at a local primary school, where there was a high proportion of students whose parents migrated from China. Like many of his Chinese friends, he grew up speaking two languages, English at school and Mandarin Chinese in the home environment.

Leo's parents were originally migrating from a northeastern coastal city in Mainland China. His father was a businessman travelling back and forth between China and Australia, while Leo's mother Jessica stayed mostly in Australia with her two children. Normally once every year, Leo went on a short visit to China with his parents. He loved those trips that he described as being "cool" and "impressive." He mentioned that he was deeply impressed by the delicious food, numerous tourist sites and a wide range of toys made in China. He felt he would never get bored during those trips because there were always exciting things in China that he had never seen or experienced in Australia. When Leo could not visit China, his most unforgettable moments were when his father returned from China with a great variety of gifts and fun stories.

Leo had a younger sister who was almost 3 years younger than him. He described his daily interaction with his sister this way,

> When I talk to my sister about our school, games and cartoons, we all speak English only. It is troublesome and weird to translate them into Chinese and my Chinese is not good enough to say much about these things. And my sister's Chinese is even worse than mine. She could only say "吃饭了 (dinner time)", "睡觉了(go to bed)", "上学了(go to school)", and nothing else, so we normally just talk to each other in English. (Leo)

Although Leo demonstrated the highest Chinese language proficiency level among all the 30 participants in the larger project (Shen and Jiang, 2021), he was still used to speaking English with his sister. It can be inferred from the statement above, the siblings did not have the sufficient knowledge of the Chinese language to carry out in-depth communication on sophisticated topics or things happening in their schools.

Leo's grandmother often visited them and helped to take care of Leo and his younger sister during her visit. Jessica spoke highly of the grandmother's role in Leo's Chinese language development before he started school, not only in oral communication in Mandarin but also in his Chinese literacy. Jessica recalled that Leo spent a larger quantity of time with his grandma than his younger sister did. When the grandmother was around, she often taught him Chinese rhymes and poems while playing with him. Although she had a slight Qingdao accent, she spoke Mandarin in an easily intelligible way. After his grandfather passed away, Leo's grandmother came to live with them in Australia permanently. Since she was advanced in years, she spent most of the time now at home, watching television or sitting in the

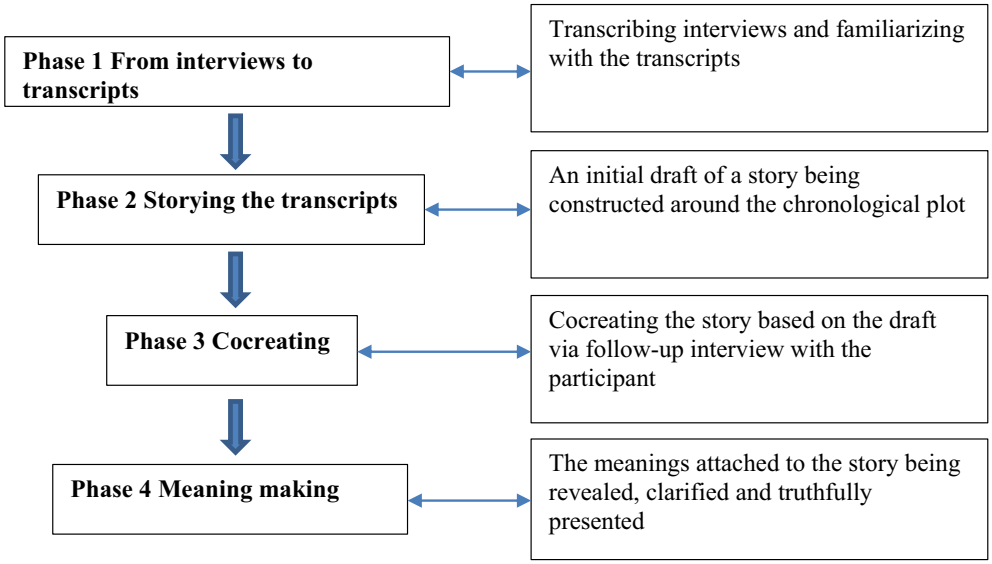



FIGURE 1
A four-phrase framework for constructing the stories.

backyard. Leo often sat together with her watching television, a habit developed since he was very young. He always respected her choice of the programs, such as the news, entertainment, drama or whatsoever it was that she loved watching in Chinese. He expressed compassion and care for her grandparents because in his eyes, his grandmother was lonely and had no friends to communicate with. Television was her best companion. Jessica believed that watching Chinese television programs with his grandmother was of great help to nurture Leo's Chinese literacy. She was amazed by the new words or sentences that Leo occasionally picked up from these programs. However, she had also recognized that the older the children grow, the less they communicate with their grandmother.

Leo was sent to weekend Chinese language school when he was 5 years old. He could not remember whether he liked it or not at the beginning, but after years of going there every weekend, he had developed friendships with other kids there that motivated him to keep going. He had several best friends there who went to the same primary school as him. In the day school, they spoke English most of the time, but occasionally he and his best friends joked with each other and shared secrets in Mandarin. On these occasions, usually his non-Chinese-background classmates did not know what they were laughing at. He commented that it was funny to do so, and it would be a great pity if he were not able to speak Chinese with his Chinese friends. He enjoyed playing with them and would miss them on weekends if he stopped going to weekend Chinese language school. He remarked, "I am proud that I can speak Chinese."

In addition to attending weekend Chinese language school, Leo started learning Chinese as a school LOTE subject in Year 4. Due to his Mandarin-speaking background and years of learning experiences at weekend Chinese language school, he deemed it a waste of time for him and his Chinese friends to sit in the LOTE class, but the school did not offer them the choice of another language or a Chinese class of a more advanced level. He was looking forward to high school, when he could choose a European language, such as Spanish, French or German, for LOTE.

Growing up in a mainly Mandarin-speaking home environment, Leo felt it was easy to understand and speak Mandarin. However, Leo also mentioned the frustration of reading Chinese books, which involved memorizing a huge number of Chinese characters that he did not know. He tried to read Chinese books annotated with *Pinyin*; however, not all the books had *Pinyin* on top of the characters. Leo considered it troublesome and time-consuming to look them up in a dictionary one by one. Sometimes he would be discouraged from reading a Chinese book by the unknown Chinese characters. His favorite Chinese stories include *Xi You Ji* (The Journey to the West) and *San Guo Yan Yi* (The Three Kingdoms). He commented that it was much more fun to read these books than to merely copy the Chinese characters as part of his homework. In addition, he also expressed his reluctance in writing Chinese because it required a great deal of time and effort to practice.

Jessica disclosed her satisfaction with all the progress her son had achieved in learning Chinese. She remarked, "it is a very wise choice to get her son immersed in a formal Chinese learning environment like weekend Chinese language school." Although she prioritized oral communication ability in Mandarin, she had been convinced by Leo's experiences that it would be better to have some knowledge of Chinese literacy than to have none at all. On their return trips to China, Leo could read at least a few public signs on the street and would not be lost. Furthermore, each time she returned from China, she purchased Chinese books for Leo. Instead of buying the sophisticated original Chinese novel, Jessica

found a simplified children's version, annotated with *Pinyin* and illustrated with pictures, which had successfully aroused Leo's interest. Leo's father often discussed with Leo an episode or a character in Leo's beloved Chinese novels. All this extra support proves to be beneficial in motivating Leo to keep learning Chinese.

Jessica holds that the world has become a global village, where bilingual or even multilingual global citizens are in great demand. The descendants of the immigrants should become confident English-speaking global citizens and cherish their roots in their heritage language and culture simultaneously. With this earnest wish, she insisted on speaking Mandarin at home and provided ample opportunities for Leo to progress in Chinese literacy.

## 6.2. Tracy's family story – "I am still fighting with my parents about not learning Chinese"

Tracy was a Year-5 student in a Catholic school. Her parents migrated from Shanghai, a south-eastern coastal city in China. Tracy was the second daughter in the family. Her father was a businessman, and her mother was a housewife. Tracy's mother, Fiona, demonstrated a distinct awareness of the potential economic value of being able to speak Mandarin. Seeing growing interest in learning Chinese worldwide, Fiona considered it a great shame if the second-generation Chinese Australians did not take advantage of their Chinese background and master the Chinese language.

However, Tracy was sent to childcare at 2 years old, which meant an early immersion for her in an English language environment. In Fiona's memory, Tracy could already speak a good amount of English by the age of 4, but she had never been fluent in speaking Mandarin. Fiona did not take it seriously until Tracy started primary school. Fiona felt shocked and deeply concerned when all of a sudden, she could not hear Tracy speak Mandarin anymore. She regretted missing the best opportunities to enforce the rule of communicating in Mandarin at home before Tracy started school. She reflected that although she always spoke to her children in Mandarin, she usually allowed them to respond in English or a mix of Mandarin and English, particularly when she was in a hurry to get a response from them.

Fiona took Tracy back to China three times to visit her grandparents and other relatives. The first visit was before Tracy went to childcare, so Fiona said Tracy did not have any memory of that experience. Fiona recalled their second visit to China, when Tracy could barely communicate with her grandparents or their relatives, which made Fiona and her husband realize the urgency of cultivating Tracy's communication abilities in Mandarin. Fiona said, "You can communicate with anyone in China if you are able to speak Mandarin, but you can only communicate with local Shanghainese if you speak the Shanghainese dialect." In addition, she was afraid that speaking the Shanghainese dialect might make her daughter more confused in learning to read and write the standard written language. Therefore, Fiona and her husband decided to consciously use more Mandarin in their daily conversations and deliberately forced Tracy to speak Mandarin. To their disappointment, however, Tracy had never been able to conquer the barrier of communication in Mandarin.

Fiona described a scenario of her two daughters watching Chinese cartoons, which left a deep impression on her. She recalled,

> The sisters often discussed the plots and characters in English while they were watching the Chinese cartoons. It appeared strange and funny to me that their brains worked like translation machines in front of the television with Chinese input from one end and then English output from the other end. (Fiona)

This observation made Fiona greatly concerned. She realized that her daughters could only partially guess what was happening in the cartoons but were unable to express themselves in Mandarin.

In Tracy's words, speaking English was definitely her first choice because she felt anything related to Chinese was hard. She had never been good at Chinese while she excelled in English. She said she spoke Mandarin only when she had to, for example, in Chinese classes or when her parents asked her to. She was keenly aware of her parents' pretense when they said to her "Speak Chinese! I cannot understand you." She mentioned she was already very used to the pattern of responding in English while her parents talked to her in Mandarin. When they suddenly showed this reaction saying that they could not understand her English, it struck Tracy that they were faking their desire and being ridiculous. Therefore, she either ignored them or gave a quick response to end the conversation.

Having realized Tracy's remarkable shift to English, Fiona followed her friend's advice to enroll Tracy in the weekend Chinese language school when Tracy reached five. She called this decision a milestone on Tracy's struggling journey of learning Chinese. Tracy was unwilling to take on extra learning on weekends; however, Fiona used any incentives she could think of to keep Tracy going, such as candies, gifts and playdays with friends. After approximately 1 year, Fiona no longer heard any arguments or excuses from Tracy about not attending Chinese classes.

Tracy gradually became accustomed to going there because she could meet her friends every weekend. However, she still occasionally had the impulse to quit when feeling overwhelmed by Chinese characters. When her mother Fiona forced her to do Chinese homework, it always made Tracy feel depressed or miserable. She even described doing Chinese homework as a nightmare, which she tried to escape or postpone to the last minute. Tracy seemed not to appreciate her mother's help with her Chinese homework. She confessed a feeling of being pushed, and her mother was not as well-tempered and patient as was her teacher. She wished she could have more fun reading and writing in Chinese, but in fact, it turned out to be frustrating and

sometimes even hopeless. She found that when she taught herself French on the iPad, she enjoyed learning a few words every now and then. However, in learning Chinese, she only felt bored and upset. Although it was an unnegotiable requirement of her parents, Tracy was "still fighting" with her parents about learning Chinese.

Tracy started with Chinese LOTE classes in her primary school from Year 3, and this continued into Year 4 and Year 5. She found the Chinese classes at school to be quite easy and relaxing. Most of her classmates were "Aussies," who was learning Chinese from scratch. She often became bored when she had to do the same Chinese exercises as the rest of the class. However, she enjoyed being an assistant to her Chinese teacher, correcting her classmates' pronunciation and helping them write Chinese characters. She felt she was smarter than the rest of the class because she learned Chinese faster than them. She was once even a "temporary teacher" when her Chinese teacher was away on sick leave. An Australian teacher in her school helped her to organize the class while she showed her fellow classmates what to do. Tracy recognized that all these positive outcomes were attributed to her hard work at weekend Chinese language school.

Upon her experiences of raising her two daughters, Fiona concluded that the earlier a child starts weekend Chinese language school, the easier it is for the parents to persuade the child to follow their decision. The difficulties of doing so increase as the child gets older. It is better to get children used to taking Chinese classes when they are small, so they naturally accept it as part of their lives. Although Tracy is still struggling in learning Chinese, Fiona holds that "it is worth the efforts we are putting in" and shows pride in Tracy's progress. Furthermore, Fiona found it extremely difficult to persuade her elder daughter to continue with weekend Chinese language school because she was involved in more extracurricular activities and had more academic pressure in high school. In Fiona's opinion, it is ideal for the children to take an early start in learning Chinese and build a solid foundation in Chinese literacy during the primary school years.

## 6.3. Anne's family story – "I will never be able to speak Chinese"

Born and raised in Australia, Anne was the only child in her family. She was studying in a Catholic school. Approximately 90 percent of the students in Anne's school were from an English-speaking background. Anne was the only student of Chinese heritage in her class. She did not have any friends with a Chinese background, and her cousins, who could speak Mandarin, Cantonese and English, were all living in Sydney.

Anne's parents originally came from Guangzhou in Mainland China, where the local spoken variety of Chinese used is Cantonese. Though having admitted to being a native Chinese speaker fluent in both Mandarin and Cantonese, Anne's mother, Chloe, formed a habit of communicating with her daughter in English. Chloe argued that since Anne was born and raised in Australia, it was natural for her to use English more often, which had naturally become her first language. Chloe could not remember when this pattern of communication started, but in her memory, Anne never voluntarily spoke Mandarin or Cantonese. Before Anne went to childcare, Anne's great grandmother helped to take care of Anne while Chloe was busy with work, so at that time Anne learned a few Cantonese words from her great grandmother. However, Chloe never meant to teach Anne Cantonese, so Anne gradually developed the pattern of only speaking English both outside and at home. In addition, Chloe had concerns over her own strong accent while speaking Mandarin, so she did not want her daughter to be influenced by her poor pronunciation of Mandarin. She tended to associate accents with the negative impression a person might leave on others. Chloe did not teach her daughter Cantonese purposefully because she did not attach any educational value to Cantonese. In her opinion, Cantonese was only used for informal communication purposes.

In Anne's recollection, when she visited her grandparents and other relatives in Sydney, she usually had little oral communication with them because they hardly spoke any English. She only played with her cousins who mainly spoke English like her. At family gatherings, when their relatives spoke Cantonese or Mandarin, Anne needed her parents to translate the key messages of their conversation. Therefore, Anne said she normally shied away from these occasions because she felt embarrassed and bored when she could not understand what was happening in their conversations.

Anne recalled she started her first attempt at learning Chinese in Sydney at the age of six, which ended soon partly because she could not understand much Chinese and partly because they were leaving for Brisbane. Later, after Anne's family settled down in Brisbane, Anne said her mother tried to persuade her to take Chinese classes again. At first, she cowered away from learning Chinese due to her initial unsuccessful experiences. Then, in the first term of Year 5, Anne was finally convinced by her mother to make another attempt. She agreed with her mother that it was beneficial to her future if she could know enough Chinese to communicate with more people and have more opportunities to get a well-paid job.

When Chloe urged Anne to make the second attempt at taking Chinese classes, she found Anne took the learning tasks more seriously and exerted more effort in her homework than previously. However, Anne still struggled in the learning process and could not achieve much progress in either communication or Chinese literacy. She revealed,

> My mother asked me to give it a try. I agreed. I really tried hard to understand the teacher and to learn some Chinese, but it did not work for me. I often got distracted in class, because I did not know what the teacher was saying. I felt I did not know a single thing about the Chinese language. It was too boring and depressing for me to sit in the Chinese class, so I gave up. (Anne)

Anne felt it was "boring" and "depressing" to learn Chinese, because she can hardly understand what the teacher was saying.

Her parents only spoke English with her, neither Mandarin nor Cantonese, which she knew they could speak. She heard her parents talk in Mandarin with their Chinese friends and relatives, but she said she could not understand a single thing they were saying. She expressed that she did not want to try learning Chinese again, because it always reminded her of the shameful experiences of knowing nothing in the Chinese class. Anne also reported, she was taught six Chinese characters each week in class, including their *Pinyin* and how to write the strokes of each character in a correct way. She felt *Pinyin* was similar to English letters and, therefore, was more easily recognizable. However, learning Chinese characters was an insurmountable barrier to her. From her perspective, some characters had meanings while others did not, and one Chinese character had to be combined with other characters to make a phrase, which was totally confusing to her. Anne confessed that she could hardly read or remember any of the Chinese characters she had learned or understand the ways the Chinese characters are combined to generate meaning.

Anne confided that her parents did encourage her to learn Chinese, but they did not really offer her much help when she struggled with the Chinese classes and homework. She believed that other learners in her Chinese class had no problem understanding the teacher because they probably got used to their parents' speaking Mandarin at home or they might have lived in China for a while. Her situation was totally different from that of her fellow classmates at the weekend Chinese language school, so she found it hopeless trying to keep pace with them. With little understanding of Mandarin, she always felt at a loss regarding what she should do and, therefore, constantly got distracted in class.

Sometimes when her mother did try to help Anne out with her Chinese homework, Anne had no idea at all about what she should do. Anne felt she did not have a single Chinese word in her mind, so it was impossible to manage her work. At first, her mother wrote down every answer for her to copy, but gradually, they abandoned this practice because both she and her mother found these efforts fruitless. Anne did not have access to Chinese television at home or any Chinese books. She had never traveled to China. In Anne's own words, she was born in Australia, lived in Australia and was definitely an Australian. Feeling deflated by the failure of her two trials, Anne felt she would never be able to speak Chinese. It would be a waste of time and money if she idled away her time in Chinese classes with little progress. Finally, both Chloe and Anne agreed that it would be of greater importance to spend the same amount of time in English literacy skills and to achieve better academic results in school.

# 7. Discussion

The stories presented in this study revealed three distinct levels of Chinese language maintenance. They shared some commonalities, such as the same country of birth, the same year at school and, most importantly, the same cultural heritage. However, they differed greatly in their perceptions about learning Chinese, school experiences and home environments, as well as noticeably disparate FLPs. Their stories have demonstrated how different FLPs could impact children's HL maintenance.

## 7.1. Parent agency of FLP

Parents' action and intervention are essential in producing desirable effects in intergenerational language maintenance (Chatzidaki and Maligkoudi, 2013; Kang, 2015; Shen and Jiang, 2021). Parents play an essential role in establishing FLPs that explicitly or implicitly enhance HL development (Curdt-Christiansen and La Morgia, 2018). In this study, parents' agency in managing children's language use in the family domain was revealed in all three cases. The highest level of parental agency was demonstrated in Leo's family, where the parents' strong belief in the value of the Chinese language, close ties to their homeland, sustained use of HL with Leo, devotion to cultivating HL literacy and high expectations of bilingualism and biliteracy constituted important aspects of their FLPs. Moreover, only Leo's parents adopted a variety of parental language management strategies in HL, such as providing books in Chinese classic literature, reading and discussing the characters with the child, and watching television in Mandarin Chinese. Home environments and activities for HL literacy are the most important part of language management, which can shape a child's bilingual or multilingual development (Curdt-Christiansen and La Morgia, 2018).

In Tracy's family, a lower level of parental agency was observed. Though emphasizing the communication ability in Mandarin Chinese, Tracy's mother neglected the significance of Chinese literacy. Cultivating HL literacy means fostering the crucial ability to decode and encode an HL text, in which values, beliefs, and cultural dispositions associated with the HL are usually embedded (Curdt-Christiansen, 2009; Shen and Jiang, 2021; Shen and Jiang, 2022). Home literacy practices in HL are explicit and overt efforts from parents to cling to their cultural roots and HL identity in addition to progress in the HL itself. Therefore, a lack of HL literacy practices is detrimental to HL development (Clyne and Kipp, 1999; Szecsi and Szilagyi, 2012; Kang, 2015; Curdt-Christiansen and La Morgia, 2018, etc.).

In addition, according to Tracy's parent, HL was beneficial instead of being necessary; therefore, she lacked motivation, determination and persistence in making her child form the habit of speaking Mandarin at an early age. When she noticed Tracy's slip into the habit of speaking English only, she started to regret not insisting on communication in their HL at home. At this point, she exercised her parental agency by asking for advice from her friends, enrolling Tracy in weekend Chinese language school and purposefully speaking more Mandarin with Tracy. However, her FLPs were not well planned, and not carefully implemented either.

Anne's parent, Chloe, acted the least parent agency in HL maintenance in this study. Her HL practices and management efforts were irregular and irresolute. She treated learning Chinese as a trial rather than attaching personal, emotional or cultural values to it. No consistent and explicit FLPs in favor of HL have been observed, and home environments for HL, which include culturally related practices, literacy-related resources and parental involvement in HL learning (Curdt-Christiansen and La Morgia, 2018), are largely lacking in Anne's case.

The disparities between the three stories have evidenced the remarkable contribution of family support to the child's HL competence. Parents' language ideology is one of the strong predicators of oral and literacy levels in HL (Kang, 2015). Family inculcation into the heritage culture, encouragement from parents in daily use of HL and familial HL learning are all significantly related to children's successful language maintenance (Mu and Dooley, 2015). Furthermore, the quality of HL language input and the influence of HL literacy experiences demonstrate to be crucial (Sun, 2019). The early HL exposure, ongoing commitment to HL use and literacy-based HL activities initiated by parents are only noticeable in Leo's story, which definitely contribute to his confidence and competence in HL. Reading and interactions based on reading not only strengthen the children's HL competence and facilitate their language production, but also enhance their social–emotional and behavioral skills (Sun, 2019). This study indicates that a high level of parent agency and support in HL, particularly in HL literacy input, is highly beneficial to language maintenance (Sun, 2019; Shen and Jiang, 2021; Shen and Jiang, 2022; Sun et al., 2022).

## 7.2. Child agency in heritage language maintenance

Children's language ideologies are shaped and negotiated in their everyday language practices at home with their parents. Immigrant parents tend to have the intention to transmit their HL and use explicit language practice and management strategies to influence their children's language development (Park and Sarkar, 2007; Szecsi and Szilagyi, 2012, etc.). However, children may contest or resist their parents' efforts and undermine their parents' FLP (Mu and Dooley, 2015; Smith-Christmas, 2022), which was exemplified by Tracy's and Anne's cases in this study. Both Tracy and Anne demonstrated resistance strategies toward HL, such as using their preferred language, English, in response to their parents, trying to escape from Chinese homework or even quitting weekend Chinese classes, which was a clear indication of language shift. Tracy was keenly aware of her parents' tricks when they said, "I cannot understand you," and her reaction of ignoring or putting the conversation to an end was plain resistance to the use of HL. In other words, she was asserting her agency in choosing the linguistic norms that she preferred. Little agency of keeping HL was found in Anne's case. It has been noted that the level of child agency coincidentally corresponds with the level of their parent agency. Where parents strongly initiate the agency of HL maintenance, more agency is observed in their children to continue the use and learning of HL. Initially, the children might just mimic their parents' linguistic codes at a very early age, and when they get a little older, they are unwillingly forced to take HL classes. However, over time, agency emerges and develops when children start to take the initiative in HL use and learning.

Compared with Tracy and Anne, Leo played an active and cooperative role in HL socialization and language maintenance at the familial level. Children's agentive use of HL significantly contributes to the successful implementation of FLPs (Smith-Christmas, 2022). Leo's agency was not only constructed and revealed in the reported daily interactions with his family members in HL but also in literacy practices, such as taking Chinese classes, reading Chinese stories and writing Chinese homework. Ideally, children are not passive followers but active contributors or collaborators of their parents' FLPs, who have the ability to make sense of what they are doing, contribute to language socialization and formulate metalinguistic comments in learning and using HL (Revis, 2019). As previous researchers argue, children can "exert their agency to make creative use of heritage language and the mainstream language" (Curdt-Christiansen and Huang, 2020, p. 182). Leo's story contained an interesting episode of creative use of HL among peers. Leo and his Chinese friends at school, though speaking English dominantly, could occasionally entertain themselves by joking with each other and sharing secrets in their HL. The same cultural background and the common experience of attending weekend Chinese language school must have enabled them to assert "in-groupness" and form intimate bonds between them through a way of communication unique to this group of bilingual children. They can "mobilize their multiple (and developing) linguistic repertoires creatively to assert their agency in language use and socialization" while others cannot (Said and Zhu, 2019, p. 773). This episode appears to be a casual and inconspicuous occasion of child HL use; however, it may trigger quality changes in the process of child HL development because this creative use of HL with peers in the mainstream language environment is child-initiated. This indicates that child autonomy in language decision-making starts to emerge in their socialization.

Many researchers regard language acquisition and language socialization as an integrated process (Fogle and King, 2013; Said and Zhu, 2019; Smith-Christmas, 2020). That means the acquisition of HL is not merely associated with formal language learning in classroom settings, focusing on various linguistic components and language skills, but more importantly, happens informally and unknowingly with different family members at home and various social partners in the communities (He, 2008). In this study, the learners' socialization with peers, e.g., siblings and schoolmates, were showcased in Leo's and Tracy's stories. The episode of "joking" and "sharing secrets" in HL between friends at school reported by Leo and Tracy's experience of being a "temporary teacher" to her "Aussie" classmates both evidenced child agency in HL use and socialization. The impact of these experiences on learners' path of bilingual development is

long-lasting and truly beneficial. However, this study also found a minimal level of HL use in the daily interactions between siblings. This could be attributed to the fact that English is the main language of the education they receive, so they absorb in all new knowledge through English.

Child agency in HL literacy was discerned only in Leo's case. He disclosed his struggle with the daunting task of learning Chinese characters and frustrating reading experiences without *Pinyin*. Despite this, he still loved the Chinese novels that appealed to him and discussed an episode or a character from these novels with his father. Agency was seen to be deployed in coping with all the difficulties that confronted Leo and be strengthened day in and day out to successfully manage HL use, either in an oral or written context.

## 7.3. Harmonious development in HL

Heritage language maintenance, as argued by many researchers, contributes to a harmonious and intimate relationship in immigrant families (Tannenbaum and Howie, 2002; Curdt-Christiansen and Huang, 2020). In contrast, maintaining harmony in implementing FLPs is also of importance to child language maintenance. Conflicts of identity and cultural values between different generations are inevitable since their encounters and experiences vary greatly (Curdt-Christiansen and Huang, 2020). How can these conflicts be melted away by harmonious FLPs in immigrant families?

As shown in Tracy's family, they have, for years, formed a pattern of the parents speaking Mandarin and the child responding in English. When the parent alarmingly realized that her daughter was likely losing the HL, they tried to break this pattern by pretending to have not understood and making their daughter repeat in Mandarin. Harmony between the parents and the child was disrupted when the child saw through their disguise and was unwilling to continue the conversation. Another thing that affected the harmonious family relationship was the impatience and bad temper Tracy's mother showed when Tracy suffered from doing her Chinese homework. There was a lack of in-depth parent–child communication about which part was too difficult for Tracy to complete on her own, what kind of support she specifically needed to overcome the difficulties and what might be easy and fun to do to balance out Tracy's frustration in doing her Chinese homework. To rebuild the harmony, parents may need to adjust their language maintenance strategies, which are more likely to arouse their child's interest in learning HL.

Heritage language is not just a connection between parents and the child but also serves as a bond with the grandparent generation or the extended family (Zhu and Li, 2016). In this study, Anne's parents selected English—Anne's preferred language—for daily communication and respected Anne's choice of giving up on Chinese classes, which seemed to have created a harmonious monolingual environment. However, there were two points in the story that might become causes of future disharmony. First, Anne recounted her feelings and experiences in weekend Chinese classes, including what struggles she had undergone and why she suffered much more than other learners in class. Though still a child, she was keenly aware of the little HL support she gained from an English-speaking home environment. She was even observant and analytical of her problems with Chinese learning. She realized it was her parents who needed to take the blame for not teaching her anything in Chinese. Second, Anne had hardly any communication with her extended family in Sydney because most of the time they spoke Cantonese or Mandarin for family gatherings. She heavily relied on her parents' translation or simply shied away from their conversations, feeling bored and embarrassed. Without HL, there was no way for Anne to establish affectional bonds with her extended family.

In contrast, the harmonious relationship between Leo and his family members, including his grandmother, can be summarized in the following two cues: first, growing up in a Mandarin-speaking home environment, he had already been accustomed to using the HL with his family members. No complaints were heard during several meetings with Leo about the inconvenience or difficulties of speaking Mandarin in daily life. The harmonious relationship gradually formed in a natural way they communicated in HL and in the discussions between the parent and the child on their beloved characters or fun episodes in stories. Second, Leo's connection with his grandmother was also an indispensable part of the harmonious family relationship. Although Leo had less communication with his grandmother as he grew up, his understanding of her physical conditions, sympathy for her loneliness, and the actions of accompanying and caring for her remained a natural habit formed when he was small. The connection between the younger generation and the grandparent generation in the immigrant family relies heavily on HL, which serves as an expression of love and a bond of affection (Zhu and Li, 2016).

## 7.4. Family language policy—Mandarin over another "dialect" or "language variety"

Each of the parents in this study could speak a dialect—indigenous Chinese language variety spoken in their hometown in China, i.e., Qingdao dialect, Shanghainese dialect and Cantonese (in Guangdong Province), respectively. However, their preference for Mandarin as an HL over their own dialect for the second generation to maintain is evident in the stories. Leo's and Tracy's parents prioritized Mandarin in their communication with children at home. Although Anne's parents chose English as the language for communication with their daughter, they still wished that Anne could understand Mandarin and achieve some Chinese literacy by taking weekend Chinese classes. Leo and Tracy were sent to weekend Chinese language schools at a relatively early age and spent years learning Mandarin and Chinese literacy.

This may be unique to Chinese language maintenance. People from different parts of Mainland China speak mutually unintelligible "dialects," which are regarded as different language

varieties; however, Chinese people are reluctant to call them different languages (Taylor and Taylor, 2014). With the diversity of dialects, there is only one written language in China, which uses Chinese characters as its writing system (Wiley et al., 2008). Mandarin is the corresponding spoken form of this written standard; therefore, parents attach political and educational value to Mandarin. As the official language variety of the Chinese government and the medium of instruction in schools, the parents were keenly aware of the potential advantages that Mandarin could bring to their children. This was confirmed by all the parents in this study who claimed themselves to be native speakers of Mandarin, though they all had their own dialects. They all wanted their children to inherit Mandarin and a certain level of Chinese literacy.

In Australia, Mandarin has also gained its place in the Australian language curriculum, which recognizes that learners bring their own linguistic and cultural background to their education (Australian Curriculum, Assessment and Reporting Authority, 2016). Together with community Chinese language schools, Mandarin as a LOTE would inevitably serve as an invisible force that pushes parents' preference toward Mandarin. In Leo's and Tracy's cases, they not only received formal instruction of Mandarin in weekend Chinese language school but also in the school LOTE program, which would certainly be conducive to their maintenance of HL and culture.

## 8. Conclusion

By re-storying the three participants' different life trajectories and language experiences, this study has presented a rich, multi-faceted and nuanced picture of FLPs in different family contexts. The stories highlighted the significance of agency in FLPs. This study suggests that more attention should be directed to the agency of children in FLPs. Child's active cooperation, agentive use of HL in the home domain and creative use of HL in socialization with peers are strong indicators of successful FLPs in Leo's language maintenance story. However, child agency does not come from nowhere. While parents initiate agency in formulating and implementing FLPs, children continue exercising the agency with their own understanding and creativity. In addition, a harmonious relationship, either in the nuclear family or in the extended family, incubates HL development in the younger generation. The Chinese language programs in community language schools and primary schools play a fundamental role in cultivating Chinese literacy, which will sustain FLPs and language maintenance in the long run.

The current study draws on a small sample of three distinct family contexts. The researchers expect to investigate a wider variety of familial contexts in the future and delve deeper into the agentive and creative use of HL by the younger generation in social and emotional interactions. Moreover, storytelling, as a unique research method of narrative inquiry, could be used more widely in HL studies. Long-term collaboration and engagement between the researcher(s) and the participants would be ideal to unpack the multilayered and complex process of HL development in children.

## Data availability statement

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

## Ethics statement

The studies involving human participants were reviewed and approved by the University of Queensland. Written informed consent to participate in this study was provided by the participants' legal guardian/next of kin.

## Author contributions

CS and WJ: study conception, design, analysis, and interpretation of results. CS: data collection and draft manuscript preparation. All authors reviewed the results and approved the final version of the manuscript.

## Funding

This article preparation was supported by the Youth Foundation of Humanities and Social Sciences of the Ministry of Education in China (grant number 21YJC740043).

## Acknowledgments

This article and the research reported were part of the CS's doctoral dissertation, which would not have been possible without the International Postgraduate Research Scholarship provided by the University of Queensland. The authors also greatly appreciate the support by the community-based weekend Chinese school for allowing us to conduct fieldwork on site and recruit participants. The results and the insights gained from the fieldwork would not have been deep and profound without the authors' prolonged engagement in the weekend Chinese school.

## Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

## Publisher's note

All claims expressed in this article are solely those of the authors and do not necessarily represent those of

their affiliated organizations, or those of the publisher, the editors and the reviewers. Any product that may be evaluated in this article, or claim that may be made by its manufacturer, is not guaranteed or endorsed by the publisher.

## Supplementary material

The Supplementary material for this article can be found online at: https://www.frontiersin.org/articles/10.3389/fpsyg.2022.1083813/full#supplementary-material

## References


Australian Bureau of Statistics. (2017). *Census Reveals a Fast Changing, Culturally Diverse Nation*. Available at: https://www.abs.gov.au/ausstats/abs@.nsf/lookup/media%20release3 (Accessed February 3, 2022).

Australian Bureau of Statistics. (2022). *Snapshot of Australia*. Available at: https://www.abs.gov.au/statistics/people/people-and-communities/snapshot-australia/latest-release#culturally-and-linguistically-diverse-communities (Accessed June 28, 2022).

Australian Curriculum, Assessment and Reporting Authority. (2016). *Languages, Foundation–year, 10 (Version 8.4)*. Available at: https://www.acara.edu.au/curriculum/foundation-year-10/learning-areas-subjects/languages-main (Accessed February 3, 2022).

Ahearn, L. (2001). Language and agency. *Annu. Rev. Anthropol.* 30, 109–137. doi: 10.1146/annurev.anthro.30.1.109

Boyd, S., Huss, L., and Ottesjö, C. (2017). Children's agency in creating and maintaining language policy in practice in two "language profile" preschools in Sweden. *Multilingua* 36, 501–531. doi: 10.1515/multi-2016-0024

Chatzidaki, A., and Maligkoudi, C. (2013). Family language policies among Albanian immigrants in Greece. *Int. J. Biling. Educ. Biling.* 16, 675–689. doi: 10.1080/13670050.2012.709817

Chen, P. (2013). Political, economical and ethnographical perspectives on teaching Chinese as a second language: a case study of Australia. *Chin. Teach. World.* 27, 400–412.

Clandinin, D. J., and Connelly, F. M. (2000). *Narrative Inquiry: Experience and Story in Qualitative Research*. San Francisco: Jossey-Bass Publishers.

Clandinin, D. J., and Rosiek, J. (2007). "Mapping a landscape of narrative inquiry: borderland spaces and tensions" in *Handbook of Narrative Inquiry: Mapping a Methodology*. ed. D. J. Clandinin (Thousand Oaks, CA: Sage), 35–76.

Clyne, M., and Kipp, S. (1999). *Pluricentric Languages in an Immigrant Context: Spanish, Arabic and Chinese*. Berlin: Mouton de Gruyter

Clyne, M., and Kipp, S. (2006). Australia's community languages. *Int. J. Sociol. Lang.* 2006, 7–21. doi: 10.1515/IJSL.2006.037

Collins, J. (2013). Multiculturalism and immigrant integration in Australia. *Can. Ethn. Stud.* 45, 133–149. doi: 10.1353/ces.2013.0037

Connelly, F. M., and Clandinin, D. J. (2006). "Narrative inquiry" in *Handbook of complementary methods in education research*. eds. J. Green, G. Camilli and P. Elmore (Mahwah, NJ: Lawrence Erlbaum), 375–385.

Cummins, J. (2005). A proposal for action: Strategies for recognizing heritage language competence as a learning resource within the mainstream classroom. *Mod. Lang. J.* 89, 585–592.

Curdt-Christiansen, X. L. (2009). Invisible and visible language planning: ideological factors in the family language policy of Chinese immigrant families in Quebec. *Lang. Policy* 8, 351–375. doi: 10.1007/s10993-009-9146-7

Curdt-Christiansen, X. L. (2014). "Family language policy: is learning Chinese at odds with learning English in Singapore" in *Learning Chinese in diasporic communities: Many pathways to being Chinese*. eds. X. L. Curdt-Christiansen and A. Hancock (Amsterdam: John Benjamins), 35–56. doi: 10.1075/aals.12.03cur

Curdt-Christiansen, X. L., and Huang, J. (2020). "Factors influencing family language policies" in *Handbook of Home Language Maintenance and Development: Social and Affective Factors*. eds. A. C. Schalley and S. A. Eisenchlas (Berlin: De Gruyter), 174–193. doi: 10.1515/9781501510175-009

Curdt-Christiansen, X. L., and La Morgia, F. (2018). Managing heritage language development: opportunities and challenges for Chinese, Italian and Pakistani Urdu-speaking families in the UK. *Multilingua* 37, 177–200. doi: 10.1515/multi-2017-0019

Czarniawska, B. (2004). *Narratives in Social Science Research: Introducing Qualitative Methods*. London: Sage

Department of Education, Skills and Employment. (2021). *Community Languages Australia-Annual Report 2020*. Available at: https://www.communitylanguagesaustralia.org.au/uploads/default/source/2021/09/5c014.CLA_2020_AnnualReport_si.pdf (Accessed February 23, 2022).

Dwyer, R., and Emerald, E. (2017). "Narrative research in practice: navigating the terrain" in *Narrative Research in Practice*. eds. R. Dwyer, I. Davis and E. Emerald (Singapore: Springer), 1–25.

Fishman, J. A. (2001). "300-plus years of heritage language education in the United States" in *Heritage Languages in America: Preserving a National Resource*. eds. J. Peyton, D. Renard and S. McGinnis (McHenry, IL and Washington, DC: The Center for Applied Linguistics and Delta Systems), 81–89.

Fogle, L., and King, K. A. (2013). Child agency and language policy in transnational families. *Issues Appl. Linguist.* 19, 1–25. doi: 10.5070/L4190005288

Gibbons, J., and Ramirez, E. (2004). *Maintaining a Minority Language: A Case Study of Hispanic Teenagers*. Clevedon: Multilingual Matters.

Hayakawa, S., Chung-Fat-Yim, A., and Mariam, V. (2022). Predictors of language proficiency and cultural identification in heritage bilinguals. *Front. Commun.* 7:994709. doi: 10.3389/fcomm.2022.994709

He, A. W. (2008). "Heritage language learning and socialization" in *Encyclopedia of Language and Education*. ed. N. H. Hornberger (Boston, MA: Springer), 2766–2778.

Hornberger, N. H., and Wang, S. C. (2008). "Who are our heritage language learners? Identity and biliteracy in heritage language education in the United States" in *Heritage Language Education: A New Field Emerging*. eds. D. M. Brinton, O. Kagan and S. Bauckus (New York: Routledge), 3–35.

Hu, J., Torr, J., and Whiteman, P. (2014). Australian Chinese parents' language attitudes and practices relating to their children's bilingual development prior to school. *J. Early Child. Res.* 12, 139–153. doi: 10.1177/1476718X13515429

Kang, H. S. (2015). Korean families in America: their family language policies and home-language maintenance. *Biling. Res. J.* 38, 275–291. doi: 10.1080/15235882.2015.1092002

King, K. A., Fogle, L., and Logan-Terry, A. (2008). Family language policy. *Lang. Linguist. Compass* 2, 907–922. doi: 10.1111/j.1749-818X.2008.00076.x

Lao, C. (2004). Parents' attitudes toward Chinese–English bilingual education and Chinese-language use. *Biling. Res. J.* 28, 99–121. doi: 10.1080/15235882.2004.10162614

Li, W. (1994). *Three Generations, Two Languages, One Family: Language Choice and Language Shift in a Chinese Community in Britain*. Clevedon: Multilingual Matters.

Merriam, S. B., and Tisdell, E. J. (2016). *Qualitative Research: A Guide to Design and Implementation, 4th Edn*. Hoboken, NJ: John Wiley.

Mills, A. J., Durepos, G., and Wiebe, E. (2010). *Encyclopedia of Case Study Research*. Los Angeles: SAGE Publications.

Montrul, S. (2018). Heritage language development: connecting the dots. *Int. J. Biling.* 22, 530–546. doi: 10.1177/1367006916654368

Mu, G. M., and Dooley, K. (2015). Coming into an inheritance: Family support and Chinese heritage language learning. *Int. J. Biling. Educ. Biling.* 18, 501–515. doi: 10.1080/13670050.2014.928258

Nasheeda, A., Abdullah, H. B., Krauss, S. E., and Ahmed, N. B. (2019). Transforming transcripts into stories: a multimethod approach to narrative analysis. *Int. J. Qual. Methods* 18, 1–9. doi: 10.1177/1609406919856797

Obojska, M. A., and Purkarthofer, J. (2018). 'And all of a sudden, it became my rescue': language and agency in transnational families in Norway. *Int. J. Multiling.* 15, 249–261. doi: 10.1080/14790718.2018.1477103

Park, S. M., and Sarkar, M. (2007). Parents' attitudes toward heritage language maintenance for their children and their efforts to help their children maintain the heritage language: a case study of Korean-Canadian immigrants. *Lang. Cult. Curric.* 20, 223–235. doi: 10.2167/lcc337.0

Revis, M. (2019). A Bourdieusian perspective on child agency in family language policy. *Int. J. Biling. Educ. Biling.* 22, 177–191. doi: 10.1080/13670050.2016.1239691

Said, F., and Zhu, H. (2019). "No, no Maama! Say 'Shaatir ya Ouledee Shaatir'!" Children's agency in language use and socialisation. *Int. J. Biling.* 23, 771–785. doi: 10.1177/1367006916684919

Schensul, S. L., Schensul, J. J., and LeCompte, M. D. (2012). *Ethnographer's Toolkit: Initiating Ethnographic Research: A Mixed Methods Approach, 2nd Edn*. Lanham, MD: Altamira Press.

Shen, C. (2017). *The role of parents and their Children's language maintenance: A study of Chinese immigrant families in Brisbane*. Unpublished Doctoral Dissertation.

Shen, C., and Jiang, W. (2021). Heritage language maintenance and identity among the second-generation Chinese-Australian children. *Biling. Res. J.* 44, 6–22.

Shen, C., and Jiang, W. (2022). Chinese immigrant parents' attitudes, expectations and practices regarding their children's Chinese language maintenance. *Herit. Lang. J.* 19, 1–26. doi: 10.1163/15507076-12340023

Smith-Christmas, C. (2020). "Child agency and home language maintenance" in *Handbook of Home Language Maintenance and Development: Social and Affective Factors*. eds. A. C. Schalley and S. A. Eisenchlas (Berlin, Boston: De Gruyter), 218–235.

Smith-Christmas, C. (2022). Using a "family language policy" lens to explore the dynamic and relational nature of child agency. *Child. Soc.* 36, 354–368. doi: 10.1111/chso.12461

Spolsky, B. (2004). *Language Policy*. Cambridge: Cambridge University Press.

Spolsky, B. (2009). *Language Management*. Cambridge: Cambridge University Press.

Spolsky, B. (2012). Family language policy – the critical domain. *J. Multiling. Multicult. Dev.* 33, 3–11. doi: 10.1080/01434632.2011.638072

Spolsky, B. (2019). A modified and enriched theory of language policy (and language management). *Lang. Policy* 18, 323–338. doi: 10.1007/s10993-018-9489-z

Sun, H. (2019). Home environment, bilingual preschooler's receptive mother tongue language outcomes, and social-emotional and behavioral skills: one stone for two birds? *Front. Psychol.* 10, 1–13. doi: 10.3389/fpsyg.2019.01640 [Epub ahead of print]

Sun, H., Low, J. M., and Chua, C. (2022). Maternal language proficiency and bilingual children's heritage language learning. *Int. J. Biling. Educ. Biling.*, 1–15. doi: 10.1080/13670050.2022.2130153

Sun, H., Ng, S. C., O'Brien, B. A., and Fritzsche, T. (2020). Child, family, and school factors in bilingual preschoolers' vocabulary development in heritage languages. *J. Child Lang.* 47, 817–843. doi: 10.1017/S0305000919000904 (published online)

Szecsi, T., and Szilagyi, J. (2012). Immigrant Hungarian families' perceptions of new media technologies in the transmission of heritage language and culture. *Lang. Cult. Curric.* 25, 265–281. doi: 10.1080/07908318.2012.722105

Tannenbaum, M. (2003). The multifaceted aspects of language maintenance: a new measure for its assessment in immigrant families. *Int. J. Biling. Educ. Biling.* 6, 374–393. doi: 10.1080/13670050308667792

Tannenbaum, M., and Howie, P. (2002). The association between language maintenance and family relations: Chinese immigrant children in Australia. *J. Multiling. Multicult. Dev.* 23, 408–424. doi: 10.1080/01434630208666477

Taylor, I., and Taylor, M. M. (2014). *Writing and Literacy in Chinese, Korean and Japanese, Revised Edition*. Amsterdam, Netherlands: John Benjamins Publishing Company.

Wiley, T. G., De Klerk, G., Li, M., Liu, N., Teng, Y., and Yang, P. (2008). "Attitudes toward mandarin, heritage languages, and dialect diversity among Chinese immigrants and international students in the United States" in *Chinese as a Heritage Language: Fostering Rooted World Citizenry*. eds. A. W. He and Y. Xiao (Honolulu, HI: University of Hawai'i Press), 67–88.

Wilson, S. (2020). Family Language Policy: Children's Perspectives. London: *Palgrave Macmillan*

Zhang, D., and Slaughter-Defoe, D. T. (2009). Language attitudes and heritage language maintenance among Chinese immigrant families in the USA. *Lang. Cult. Curric.* 22, 77–93. doi: 10.1080/07908310902935940

Zhu, H., and Li, W. (2016). Transnational experience, aspiration and family language policy. *J. Multiling. Multicult. Dev.* 37, 655–666. doi: 10.1080/01434632.2015.1127928

frontiers | Frontiers in Psychology

TYPE Original Research
PUBLISHED 17 January 2023
DOI 10.3389/fpsyg.2022.1059895



OPEN ACCESS

EDITED BY
He Sun,
Nanyang Technological University,
Singapore

REVIEWED BY
Melita Kovacevic,
University of Zagreb,
Croatia
Rob Kim Marjerison,
Wenzhou-Kean University,
China
Yusong Gao,
Northwest Normal University,
China
Shuo Lillian Yang,
Wenzhou-Kean University,
China

*CORRESPONDENCE
Wenchun Yang
w.yang@leibniz-zas.de
Angel Chan
angel.ws.chan@polyu.edu.hk
Natalia Gagarina
gagarina@leibniz-zas.de

SPECIALTY SECTION
This article was submitted to
Language Sciences,
a section of the journal
Frontiers in Psychology

RECEIVED 02 October 2022
ACCEPTED 10 November 2022
PUBLISHED 17 January 2023

CITATION
Yang W, Chan A and Gagarina N (2023)
Left-behind experience and language
proficiency predict narrative abilities in the
home language of Kam-speaking minority
children in China.
*Front. Psychol.* 13:1059895.
doi: 10.3389/fpsyg.2022.1059895



# Left-behind experience and language proficiency predict narrative abilities in the home language of Kam-speaking minority children in China

Wenchun Yang[1,2]*, Angel Chan[3,4,5]* and Natalia Gagarina[2]*

[1]School of Foreign Studies, Xi'an Jiaotong University, Xi'an, China, [2]Leibniz-Centre General Linguistics (ZAS), Berlin, Germany, [3]Department of Chinese and Bilingual Studies, The Hong Kong Polytechnic University, Kowloon, Hong Kong SAR, China, [4]Research Centre for Language, Cognition, and Neuroscience, The Hong Kong Polytechnic University, Kowloon, Hong Kong SAR, China, [5]The Hong Kong Polytechnic University – Peking University Research Centre on Chinese Linguistics, Hong Kong, Hong Kong SAR, China

**Introduction:** Studies have documented that child experiences such as external/environmental factors as well as internal factors jointly affect acquisition outcomes in child language. Thus far, the findings have been heavily skewed toward Indo-European languages and children in the Western, educated, industrialized, rich and democratic (WEIRD) societies. By contrast, this study features an understudied minority language Kam, and a group of so-called left-behind children in China growing up in a unique social-communicative environment.

**Methods:** Fifty-five bilingual children aged 5–9 acquiring Kam as home language were assessed using the Multilingual Assessment Instrument for Narratives (LITMUS MAIN). Twenty-three "two parents-left" children (mean age=6;8, range: 5;0–9;2) remained in rural areas while both parents went to cities for employment, and they were raised by their grandparents. Thirty-two were "one parent-left" peers (mean age=7;3, range: 5;0–9;3) who also resided in rural areas but were raised by one parent. Oral narrative texts were analysed for macrostructure based on story structure (SS), story complexity (SC) and internal state terms (IS). The study examined whether and how narrative production is predicted by internal factors such as chronological age and linguistic proficiency of a child and an external factor such as left-behind experience. Four measures were scored as outcome measures: SS, SC, IS type, IS token. Four measures were taken as predictors: chronological age, left-behind experience, scores in a lexical production task, and scores in a sentence repetition task tapping expressive morphosyntactic competence.

**Results:** Results showed that left-behind experience consistently predicted all four outcome measures, where the "two parents-left" children scored significantly lower than their "one parent-left" peers. Expressive vocabulary scores predicted three measures: SS, SC, and IS Token. Expressive morphosyntactic scores predicted SS and SC. Age, by contrast, did not predict any outcome measure.

**Discussion:** These findings suggested that being left-behind by both parents may be a negative prognostic indicator for the development and maintenance

of heritage language abilities in ethnic minority children. We further discussed the conceptual significance of what it means for a child to be left-behind, by relating to more basic external factors in language development, including caregiver educational level, and amount of home language and literacy support by the caretakers.

KEYWORDS

**narrative abilities, Kam-speaking, left-behind experience, linguistic proficiency, home language**

## Introduction

Child experiences as well as internal factors jointly affect acquisition outcomes in child language (Paradis, 2011). While it is encouraging to note that there are increasingly more acquisition studies addressing internal and external factors in Asia (see, e.g., Dixon et al., 2012; Sun et al., 2016, 2018, 2020, 2022), the child language literature, however, is still heavily skewed toward Indo-European languages and the Western, Educated, Industrialized, Rich, and Democratic (WEIRD) societies (Henrich et al., 2010; Kidd and Garcia, 2022). This study, by contrast, features an understudied language, Kam, in a group of so-called left-behind children in China. Kam belongs to the Kam-Shui language branch of the Kam-Tai family and is spoken by 3.5 million minority Kam people residing in South (West) China (Office of Leading Group of the State Council for the Seventh National Population Census, 2021). Kam is a SVO language and has a complex and conservative tone system with up to 15 phonetic tones (Wu, 2018). Kam is undergoing language change due to intensive language contact with Chinese from formal schooling, TV broadcasting and employment (Yang, 2017). Kam does not have a widely used orthography or writing system but is transmitted more as an oral language. Kam-speaking people read and write in Chinese.

For decades as China continues its socioeconomic reform and urbanization, a large number of adult rural residents have been migrating to cities to seek work opportunities. Their young children, whose number exceeded 40 million by 2015 (National Bureau of Statistics of China, UNICEF China, UNFPA China, 2017), however, stayed behind in the rural areas due to various reasons. These children are called left-behind children (The State Council of the People's Republic of China, 2016). There are two scenarios of the left-behind experience in terms of the number of parent(s) absent. One being the child staying with one parent (usually the mother) while the other parent goes to urban areas for work (one parent-left). Another being the child staying with the grandparents or other relatives while both parents leave for urban cities (two parents-left; Lu, 2012). In most cases, these caretakers are low-educated and lack the knowledge to take adequate care of these children and support language, psychological, cognitive, and other important aspects of child development. There are often a lack of quality and stimulating interactions between these children and caregivers.

Moreover, these children may experience generally reduced home language input. This is because most left-behind children grow up in low socioeconomic status (SES) families and parents from low SES families often encourage their children to use the majority language more often than their home (i.e., minority) language to become more successful at school (Lambert and Taylor, 1996). This parental preference could lead to further challenges in these children's home language development and maintenance. Furthermore, most left-behind children live in remote rural areas in poor provinces in Western and Southwestern China where there is limited access to resources and facilities for learning such as books and libraries (Han et al., 2017). Taken together, the prolonged absence of parental care, the loss of solid family structure, poor living conditions and lack of learning resources make these children more vulnerable to developmental, behavioral and psychological problems (Wen and Lin, 2012; Wang and Mesman, 2015; Lu et al., 2021).

These left-behind children in general and their language development, in particular, have not received much attention in the developmental literature. While there are differences in reasoning abilities (Liu et al., 2018) and social skills (Hu et al., 2020) between the one parent-left and two parents-left groups, the impact of this unique social-communicative environment on language development of these left-behind children, especially their home language development, awaits further investigation.

In this paper, we focus on children's narrative abilities, as narratives are an indispensable part of one's social life. Narrative competence is also a strong predictor of children's later academic achievement in literacy, reading and mathematics (e.g., Hayward and Schneider, 2000; O'Neill et al., 2004; Swanson et al., 2005; Oakhill and Cain, 2012). Narrative abilities can be evaluated on macrostructure and microstructure levels. Macrostructure is the global setting of a story, referring to a higher order of hierarchical organization of episodes and story grammar components such as characters' goal, attempt, outcome and reaction (Heilmann et al., 2010), and draws upon cognitive skills and theory of mind abilities. Macrostructure includes three components: Story structure (SS), story complexity (SC) and internal state terms (IS) (Gagarina, 2016). SS captures the quantitative dimension by

counting the number of story grammar elements expressed, e.g., Setting, Initiating Event, Goal, Attempt, Outcome, and Reaction. SC captures the qualitative dimension by examining children's ability to combine the main episodic elements Goal-Attempt-Outcome to verbalize a complete episode in narratives. IS are words denoting mental states including, for instance, perceptual state (e.g., see, hear), physiological state (e.g., thirsty, hungry), consciousness (e.g., alive, awake), emotion (e.g., sad, happy), and mental verbs (e.g., want, think, know).

Macrostructure has been shown to be affected by multiple factors, both external and internal (Gagarina, 2016). The current study targets the higher-order organization of narratives. It therefore addresses macrostructure and contributes to the existing research by reporting data on narrative production by Kam-speaking children in their home language, examining the role of internal and external factors on narrative organization. External factors relate to children's language environment and experiences including parental education and language use. Internal factors refer to those related to children's inherent characteristics including, for instance, chronological age (henceforth age), IQ, linguistic proficiency (Armon-Lotem et al., 2011). In the first round of analyses, we focused on one external factor (children's left-behind experience), and two internal factors (chronological age, linguistic proficiency) which have been reported to be associated with children's narrative macrostructure production (Lindgren and Bohnacker, 2021). In the subsequent analyses, we further investigated children's left-behind experience by examining child caretaker characteristics and the quality of home experiences/environment and degree of family support and engagement. The following section elaborates on the relevant literature.

# Factors influencing children's narrative macrostructure production

## Left-behind experience

To our knowledge, no studies have investigated the effect of left-behind experience on narrative macrostructure production. There are, on the other hand, two studies examining the relationship between left-behind experience and children's cognitive skills and receptive vocabulary competence. A longitudinal study by Hu et al. (2020) reported that left-behind preschoolers who stayed with one parent performed better in executive functioning tasks and Chinese reading than those who stayed with their grandparents with both parents being absent. Ding et al. (2021) reported that left-behind children aged 4–6 staying with one parent scored higher in receptive vocabulary than their peers who stayed with grandparents. Similarly, Liu et al. (2018) reported that the development of theory of mind in school-aged left-behind children was slower than the non-left-behind children. Overall, left-behind children, especially whose parents were both absent, scored lower in these cognitive and language tasks.

Left-behind experience bears on the quantity and quality of home experiences/environment and degree of family support and engagement, which have been shown to highly correlate with children's development of narrative abilities. For example, in the longitudinal study on Spanish-English bilinguals with low-income backgrounds from preschool to first grade, Bitetti and Hammer (2016) reported a positive impact of home language experience on children's English narrative macrostructure skills. Being frequently exposed to literacy activities (e.g., book reading) allows children to internalize the global structure of narrative and use it when they tell their own stories. Relating to these left-behind children, long-term family separation causes challenges including limited quality parent–child communication and limited home literacy-related activities such as shared book reading and storytelling, which are not conducive to children's cognitive and linguistic development.

## Linguistic proficiency

Linguistic proficiency has been reported to be a significant predictor of narrative macrostructure (e.g., Lindgren, 2018; Fiani et al., 2021). Conceptually this relationship is reasonable as narrative macrostructure production requires support from foundational linguistic skills including lexical and morphosyntactic competence. Children need to use diverse and appropriate vocabulary, syntactic structure and morphology to formulate a story. A number of studies have shown that expressive vocabulary is significantly associated with children's narrative macrostructure skills (e.g., Uccelli and Páez, 2007; Lindgren and Bohnacker, 2020, 2021). Uccelli and Páez (2007) reported a significant correlation between expressive vocabulary and story structure in 5–7 years old Spanish-English bilinguals in their two languages. Interestingly, Lindgren and Bohnacker (2021) elicited story narratives from a group of 4–6 years old German-Swedish bilinguals and reported that expressive vocabulary predicted children's story structure performance only for German (the minority language) but not for Swedish (the majority language). The authors reasoned that children need to achieve a certain level of lexical skills to narrate a story with a well-formed global organization. Some German-Swedish children might not have achieved this "threshold" level of vocabulary competence in their weaker minority language German and therefore their weak lexical skills could restrict their expressive narrative macrostructure. If so, the association between lexical skills and expressive narrative macrostructure could be tighter/stronger in the weaker minority language than the majority language.

The relationship between morphosyntactic skills and macrostructure was less examined in previous studies. Some studies reported positive correlations between narrative macrostructure and morphosyntactic competence as reflected by children's narrative microstructure skills. For instance, Iluz-Cohen and Walters (2012) examined narrative production in English-Hebrew preschoolers and

reported that story structure scores correlated with children's narrative microstructure skills in morphosyntax in both languages. Rodina (2017) examined a group of Norwegian-Russian bilingual children aged 4;6 and reported that expressive narrative macrostructure scores correlated with their mean length of utterance, a measure of morphosyntactic competence, in children's home minority language Russian. These studies, however, derived their measures on narrative macrostructure competence and morphosyntactic competence from the same narrative samples. Further research can use independent measures of morphosyntactic competence to further evaluate the relationship between narrative macrostructural competence and morphosyntactic competence in children's home language.

### Age

Age has also been reported as a significant predictor of children's narrative abilities (Bohnacker, 2016; Maviş et al., 2016; Roch et al., 2016; Lindgren and Bohnacker, 2021). In general, older children score higher in story structure and produce a higher level of story complexity as they are supported by more advanced cognitive and linguistic skills to express the contents and temporal-causal relationships in a story. In addition, older children may also have more opportunities to take part in literacy-related activities such as book reading and storytelling, which help them acquire more skills and knowledge to organize a story. On the other hand, it is possible that age effects are less prominent in a minority home language acquisition context, when language outcome measures are more affected by environmental factors such as amount of target language exposure and home literacy-related activities (Bohnacker et al., 2021; Lindgren and Bohnacker, 2021). Bohnacker et al. (2021) studied the age effect on narrative macrostructure elicited from 100 Turkish-Swedish bilingual children aged 4–7. They reported a weaker relationship between age and children's story structure scores in the home language Turkish. The same pattern was reported by Lindgren and Bohnacker (2021) who reported that the age effect on macrostructure performance was weaker in the home language, German, of forty-one German-Swedish bilinguals aged 4–6. Age effects were weaker in these children's macrostructure competence in their home minority language, likely because home minority language is often associated with lower exposure to literacy-related activities (Bitetti and Hammer, 2016).

## The current study

This study examines whether and how the external factor [i.e., left-behind experience (one parent-left and two parents-left)] and internal factors (i.e., linguistic proficiency measured by lexical and morphosyntactic skills, and age) affect children's expressive narrative macrostructure in their home minority language. Narrative macrostructure is operationalized as SS, SC and IS tokens and types (see above for more details). Each research question addresses one macrostructure component/dimension. The research questions and their predictions are stated below:

1. Does left-behind experience predict the production of narrative macrostructure in the minority language Kam?

Prediction: Since left-behind experience has been reported to negatively correlate with the development of cognitive and linguistic skills (Liu et al., 2018; Hu et al., 2020; Ding et al., 2021), and that these foundational abilities support narrative competence, it is reasonable to expect that the outcome measures in narrative macrostructure would be significantly affected by this factor. Specifically, children who are left behind by both parents are expected to score lower in macrostructure than those who are left behind by only one parent.

2. Does linguistic proficiency predict narrative macrostructure in Kam?

Prediction: Consider that linguistic proficiency indexed by lexical and morphosyntactic competence has been reported as a significant predictor of children's narrative abilities (Bohnacker et al., 2021; Fiani et al., 2021), and that the effect is stronger in the home minority language (Lindgren and Bohnacker, 2021), we predicted a strong association between vocabulary and morphosyntactic abilities and narrative abilities in Kam.

3. Does age predict narrative macrostructure in Kam?

Prediction: Consider studies which have reported weaker age effects in a minority home language acquisition context, when language outcome measures are more affected by environmental factors such as amount of target language exposure and home literacy-related activities (Bohnacker et al., 2021; Lindgren and Bohnacker, 2021), as well as our expectation that the home language environment of these left-behind children is often associated with insufficient language learning support and resources and literacy-related activities in the home language, we predict a weak or even no significant age effect on narrative macrostructure.

## Materials and methods

### Participants

Fifty-five ($N = 55$) Kam-Mandarin ethnic minority bilingual children aged 5 to 9 participated in this study with written consent from their caretakers. Twenty-three ($N = 23$) were two parents-left children (two parents-left group; mean age = 6;8, range: 5;0–9;2) who remained in rural areas while their parents both went to cities for employment and were raised by their low SES caretakers. Thirty-two ($N = 32$) were SES matched one parent-left peers (one parent-left group; mean age = 7;3, range: 5;0–9;3) who also resided in rural areas but only one parent went to cities for work. All participants acquired

Kam as home and first language (L1) and Mandarin as school and second language (L2) from age 3. All children were recruited from Guangxi Zhuang Autonomous Region in South China and lived in a town with the majority of the Kam population speaking Kam from birth and had never lived in another place for more than 1 month. All children attended kindergarten (5–7 h a day) and primary school (7–8 h a day) with formal education in L2 Mandarin. According to the care-taker questionnaire (Gagarina et al., 2019), these children had no reported learning disabilities and neurological, psychological, or social disorders.

## Materials

### Linguistic proficiency

Children's linguistic proficiency was assessed in terms of expressive lexical ability and morphosyntactic ability. Children's expressive lexical competence was assessed by the Multilingual Naming Test (MINT, Gollan et al., 2012; Ivanova et al., 2013). Children were required to name the object depicted in the picture. A score of 0 or 1 was assigned to each picture according to accuracy of response (0-incorrect, 1-correct). The full score is 67 marks. Children's morphosyntactic competence was assessed by a sentence repetition task (SRep) adapted into Kam (Marinis and Armon-Lotem, 2015). SRep consists of SVO sentences with auxiliaries, negation, aspect marker, biclausal complement (e.g., "After Father had dinner in the evening, he went to take a shower.") and complex sentences including wh-questions, relative clauses, and passives. There are 57 sentences in total and each sentence contains 9–13 syllables. Children's responses were scored 0 (incorrect) or 1(correct). A score of 1 was given to only responses which were exactly the same as the target structures.

### Narrative production

Children's narrative production abilities were assessed by the Kam version of the Multilingual Assessment Instrument for Narratives (LITMUS MAIN, Gagarina et al., 2015, 2019; Kan et al., 2020; Yang et al., 2020). MAIN is an assessment tool for narrative skills which has been adapted into 92 language versions and is widely used in testing children's story narrative competence cross-linguistically. It consists of four picture-based stories: Cat, Dog, Baby Birds and Baby Goat. Each story has six pictures consisting of three episodes. All four stories were used to elicit narratives.

We followed the standard guidelines of MAIN in task administration (Gagarina et al., 2019). Children first looked at the pictures and then were asked to tell and retell the relevant stories in Kam. Stories for retelling were pre-recorded by a native speaker. Children's narrated stories were transcribed verbatim by a trained native speaker. The data were coded following the scoring form of MAIN. 20% data were transcribed and coded by a second trained native speaker for intercoder reliability check. The percentage of agreement in transcription and coding was 99.0 and 97.0%, respectively.

Three components of macrostructure were evaluated: SS, SC, and IS. SS has a maximum score of 17. This score is derived from the five story grammar elements of an episode, IS as Initiating Event, Goal, Attempt, Outcome, IS as a Reaction (one mark for one element), multiplied by the number of episodes (3) in a story, with 2 more points given for the story setting (time and place). SC has a maximum score of 3 for each episode. A score of 0 was given if neither G, A nor O was expressed in an episode. A score of 1 would be given to a sequence without G (i.e., A, O or a combination of AO), a score of 2 was given to an incomplete episode with G, or a combination of GA or GO. A complete episode with GAO all verbalized was given 3 marks. As for IS, both token and type measures were scored (1 token/type, 1 score).

### Home language environment

As we will see in section "Further analyses" we will further discuss what it means for a child to be left-behind, by relating to more basic external factors in language development including amount of home language use by caretakers, home literacy support, and education level of caretaker(s). To address this, we refer to data collected by a caregiver questionnaire (Gagarina et al., 2019). The questionnaire asks questions about children's language background, left-behind experience, caregiver's amount of home language use and education level (in terms of years of education), and home literacy support indexed by frequency of storytelling at home (e.g., "How often do you do storytelling with your child in the last month?") and number of non-textbooks the child has at home (e.g., "How many non-textbooks do you have at home?"). The number of non-textbooks at home was reported on a 5-point scale: 0 = 0–5 books; 1 = 5–20 books; 2 = −20–50 books; 3 = 50–100 books; 4 = more than 100 books. The caregiver rated the frequency of storytelling on a 4-point scale: 0 = never, 1 = twice a month, 2 = once or twice a week and 3 = almost every day. Amount of home language use by caregiver(s) in response to the question "How much Kam do you use in your daily communication with your child?" was also rated on a 5-point scale: 0 = never, 1 = seldom, 2 = sometimes, 3 = usually, 4 = always. Caretakers' education level was calculated in terms of years of education completion.

# Results

## First round of analyses

### Descriptive statistics

Table 1 shows the descriptive statistics of children's scores in the four narrative outcome measures (i.e., SS, SC, IS type and token). The two parents-left group scored numerically lower than the one parent-left group across all measures of narrative macrostructure. Mann–Whitney U test showed significant group differences in SS ($p < 0.05$) and IS type ($p < 0.01$). Despite no significant group difference in SC ($p > 0.05$), qualitative analyses showed that there were fewer children in the two parents-left

group who could produce at least one complete GAO episode, relative to the one parent-left group [56.52% (13/23) vs. 68.75% (22/32)].

### Effects of left-behind experience, linguistic proficiency, and age

Correlations between predictors in the two rounds of analyses were first computed. Weak and moderate correlations (i.e., correlation coefficients below 0.7; Ratner, 2009) were found (Table 2), signaling a low degree of multicollinearity.

A linear mixed-effects model was run in R (version 4.2.0; R Core Team, 2022) with the lme4 package (version 1.1–18-1, Bates et al., 2015). Left-behind experience (one parent-left vs. two parents-left), expressive vocabulary scores, expressive morphosyntax scores and age were included as fixed effects, and participants as a random effect. A top-down model building strategy was adopted by starting with a full model and stepwise removing predictors that did not significantly contribute to the model fit. The model fit was tested by comparing the two subsequent models using the *anova* function.

Table 3 presents the significant terms in the final model for each narrative outcome measure. SS scores were negatively predicted by left-behind experience ($\beta = -1.936$, SE = 0.486, $t = -3.980$, $p < 0.001$) and positively predicted by lexical ($\beta = 0.085$, SE = 0.024 $t = 3.521$, $p < 0.001$) and morphosyntactic competence ($\beta = 0.156$, SE = 0.035, $t = 4.517$, $p < 0.001$). SC scores were negatively predicted by left-behind experience ($\beta = -0.740$, SE = 0.306, $t = -2.420$, $p < 0.05$) and positively predicted by both lexical ($\beta = 0.046$, SE = 0.015, $t = 3.032$, $p < 0.01$) and morphosyntactic competence ($\beta = 0.051$, SE = 0.021, $t = 2.329$, $p < 0.05$). IS scores (type measures) were negatively predicted by left-behind experience ($\beta = -0.463$, SE = 0.159, $t = -2.906$, $p < 0.01$) and not other factors. IS scores (token measures) were negatively predicted by left-behind experience ($\beta = -0.954$, SE = 0.426, $t = -2.236$, $p < 0.05$) and positively predicted by lexical competence ($\beta = 0.054$, SE = 0.019, $t = 2.754$, $p < 0.01$).

Taken together, left-behind experience negatively predicted all four outcome measures in macrostructure competence, indicating that two parents-left children scored significantly lower than one parent-left children. Expressive lexical competence positively predicted SS, SC, and IS (tokens) scores. Morphosyntactic competence positively predicted SS and SC scores. Age did not contribute to the model fit and was removed from the model, indicating that age was a not a significant predictor for all outcome measures.

## Further analyses

Left-behind experience, a general notion, is associated with a number of characteristics impacting different facets of life, including amount of home language and literacy support that is important for a child's language development. We therefore conducted some further analyses to examine whether/how some more basic external factors associated with left-behind experience might predict these narrative outcome measures (Bitetti and Hammer, 2016; Pace et al., 2017). Specifically, we examined the effect(s) of caregiver education level, amount of home literacy support indexed by the number of non-textbooks at home and frequency of storytelling in Kam at home, and amount of home language support indexed by amount of Kam the caregiver used with the child. Linear mixed-effects models were run with left-behind experience being replaced by these external factors, while keeping expressive lexical and morphosyntactic scores as fixed effects, and participants as random effects.

TABLE 1 Descriptive statistics of children's scores in each outcome measure of macrostructure competence (mean (SD) and score range).

| Left-behind experience | Story structure (SS) | | Story complexity (SC) | | Internal state terms (types) | | Internal state terms (tokens) | |
|---|---|---|---|---|---|---|---|---|
| | Mean (SD) | Range | Mean (SD) | Range | Mean (SD) | Range | Mean (SD) | Range |
| Two parents-left | 6.22 (2.57) | 2–14 | 4.43 (1.40) | 2–9 | 2.74 (0.54) | 1–4 | 4.74 (1.84) | 2–12 |
| One parent-left | 7.80 (2.34) | 1–15 | 5.04 (1.25) | 2–9 | 3.22 (0.66) | 2–4 | 5.59 (1.48) | 3–10 |

TABLE 2 Summary of intercorrelations between predictors.

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|---|---|---|---|---|---|---|---|
| 1. Left-behind experience | 1 | | | | | | |
| 2. Lexical competence | 0.071 | 1 | | | | | |
| 3. Morphosyntactic competence | 0.075 | 0.378*** | 1 | | | | |
| 4. Caregiver's education level | −0.558*** | 0.001 | 0.120 | 1 | | | |
| 5. No. of non-textbooks | −0.213* | −0.057 | 0.051 | 0.469*** | 1 | | |
| 6. Frequency of storytelling in Kam | −0.132 | −0.344*** | −0.003 | 0.152 | −0.043 | 1 | |
| 7. Amount of Kam use | 0.161 | 0.139 | 0.170 | −0.221* | −0.159 | −0.152 | 1 |

*$p < 0.05$, **$p < 0.01$, ***$p < 0.001$.

TABLE 3 Significant terms in the final model for performance in each outcome measure of macrostructure competence in the first round of analyses.

| Measure | Predictor | Estimate | SE | *t* |
|---|---|---|---|---|
| Story structure | (Intercept) | −2.643 | 1.534 | −1.723 |
| | Left-behind experience | −1.936 | 0.486 | −3.980*** |
| | Lexical competence | 0.085 | 0.024 | 3.521*** |
| | Morphosyntactic competence | 0.156 | 0.035 | 4.517*** |
| Story complexity | (Intercept) | 0.901 | 0.966 | 0.933 |
| | Left-behind experience | −0.740 | 0.306 | −2.420* |
| | Lexical competence | 0.046 | 0.015 | 3.032** |
| | Morphosyntactic competence | 0.051 | 0.021 | 2.329* |
| Internal state terms (types) | (Intercept) | 2.984 | 0.103 | 28.984*** |
| | Left-behind experience | −0.463 | 0.159 | −2.906** |
| Internal sate terms (tokens) | (Intercept) | 3.440 | 0.834 | 4.123*** |
| | Left-behind experience | −0.954 | 0.426 | −2.236* |
| | Lexical competence | 0.054 | 0.019 | 2.754** |

*$p < 0.05$, **$p < 0.01$, ***$p < 0.001$.

TABLE 4 Significant terms in the final model for performance in each outcome measure of macrostructure competence in the follow up analyses.

| Measure | Predictor | Estimate | SE | *t* |
|---|---|---|---|---|
| Story structure | (Intercept) | −4.607 | 1.585 | −2.906** |
| | Education | 0.372 | 0.099 | 3.736*** |
| | Lexical competence | 0.084 | 0.024 | 3.544*** |
| | Morphosyntactic competence | 0.133 | 0.035 | 3.827*** |
| Story complexity | (Intercept) | 1.651 | 0.730 | 2.263* |
| | Education | 0.135 | 0.065 | 2.076* |
| | Lexical competence | 0.056 | 0.014 | 3.909*** |
| Internal state terms (types) | (Intercept) | 2.357 | 0.218 | 10.817 |
| | Education | 0.072 | 0.033 | 2.146* |
| Internal state terms (tokens) | (Intercept) | 1.822 | 0.979 | 1.862 |
| | Education | 0.222 | 0.086 | 2.576* |
| | Lexical competence | 0.050 | 0.019 | 2.593* |

*$p < 0.05$, **$p < 0.01$, ***$p < 0.001$.

Results (Table 4) indicated that caregiver education level positively predicted all four outcome measures of macrostructure competence. Expressive lexical competence positively predicted SS ($\beta$ = 0.084, SE = 0.024, $t$ = 3.544, $p < 0.001$), SC ($\beta$ = 0.056, SE = 0.014, $t$ = 3.909, $p < 0.001$) and IS (tokens) scores ($\beta$ = 0.050, SE = 0.019, $t$ = 2.593, $p < 0.05$). Morphosyntactic scores positively predicted SS scores ($\beta$ = 0.133, SE = 0.035, $t$ = 3.827, $p < 0.001$) and no longer SC scores. Again, no significant age effects were registered. The number of non-textbooks at home and the frequency of storytelling at home were not significant predictors. This is likely due to the generally low numeral values of these variables with small variations within each variable, and therefore did not yield any significant results. Specifically, 95% of caretakers reported fewer than 5 non-textbooks at home and these children also seldom had storytelling activities at home. Interestingly, the amount of home language use by caregiver(s) was not a significant predictor either. We will discuss our speculation in the discussion section.

## Discussion

We reported the first empirical study investigating left-behind Kam-speaking children's narrative abilities and their predictors in their home language, Kam. Specifically, we examined whether the external factor indicated by left-behind experience, and internal factors indicated by lexical and morphosyntactic skills and age predict the expressive narrative macrostructure competence in a group of children aged 5–9. Left-behind children were divided into two groups depending on whether one or two parents left for urban areas. Since *left-behind* is a composite phenomenon, we further examined caregiver characteristics and amount of home language and literacy support by caregivers, including caregiver education level, amount of home literacy support indexed by number of non-textbooks at home and frequency of story-telling activities at home, and amount of home language use by the caregiver to the child. There were four outcome measures of macrostructure competence: SS, SC, IS (types) and IS (tokens). As expected, left-behind experience negatively predicted performance in all four outcome measures. Lexical competence positively predicted SS, SC and IS (tokens) scores. Morphosyntactic competence positively predicted SS and SC scores. No significant age effects were found. Below we discuss each predictor.

Left-behind experience as a *whole* negatively predicted narrative macrostructure competence, indicating that children who were raised by their grandparents/relatives scored lower than those who were raised by one of the parents across all four outcome measures. Further analyses showed that caregiver's education level positively predicted all four outcome measures of macrostructure competence. More educated caregivers often can provide more learning support and stimulating adult-child communication that are conducive to child language development. In general, these children's parents have higher education level than their grandparents/relatives. "One parent-left" children likely have more language learning support from their higher educated parent than the "two parents-left" children raised by lower educated grandparents/relatives. Home literacy support indexed by number of non-textbooks at home and amount of story telling activities at home, and home language support indexed by amount of home language use by the

caregiver to the child did not turn out to be significant predictors of these outcome measures either. This is likely due to the generally low values and small variations within factor for these predictors (see Results section). Our speculation is that although Kam is the children's home language, the caregivers seldom had communication with the children.

Expressive lexical competence positively predicted performance in SS, SC and IS (tokens) scores. This finding partially aligns with previous results. For instance, Bohnacker et al. (2021) and Lindgren and Bohnacker (2021) reported a positive relationship between expressive lexical competence and SS in Turkish-Swedish bilingual children and German-Swedish bilingual children, respectively. These two studies, however, did not examine the effect of lexical competence on SC and IS. Gagarina (2016) examined expressive macrostructure competence in a group of Russian-German bilingual children aged 4–9 and reported that performance on SS and SC, but not IS, was invariant between languages. Based on these findings, she suggested that SS and SC are less language dependent, whereas IS is more language dependent and contingent on language-specific lexical knowledge. The current finding, on the other hand, indicates that the three outcome measures (SS, SC and IS) are all dependent on lexical competence in the target language. This might be due to the restricted expressive vocabulary competence in Kam in these children. Children need a *critical mass* of lexical items in their repertoire in order to support them to express story grammar elements. Previous studies did not consistently register a significantly positive relationship between lexical and macrostructure competence, likely because some children in those studies exceeded the so-called "threshold" level of lexical competence, and therefore their macrostructural performance was less restricted/dependent on lexical competence scores (that is, children scoring lower or higher in lexical measures, would not be disadvantaged or advantaged in their narrative macrostructure competence, as both would still have adequate vocabulary to support expression of basic story grammar elements; see Gagarina et al., 2019; Lindgren and Bohnacker, 2021). IS, on the other hand, by nature depends on vocabulary size of the child. Morphosyntactic competence predicted SS and SC. This is conceptually reasonable as expression of story grammar elements requires foundational morphosyntactic abilities to combine words together (Iluz-Cohen and Walters, 2012; Lindgren and Bohnacker, 2021).

Age was not a significant predictor, as expected. This is consistent with previous results by Bohnacker et al. (2021) and Lindgren and Bohnacker (2021) which reported only a weak relationship between age and macrostructural performance in the home language. In our study, there was not even a weak age effect, and we suspected that this is due to the unique non-conducive socio-communicative environment of these left-behind children, causing the associated external factors such as left-behind experience and educational level of caregivers to be particularly prominent in their effects on these children's narrative competence, rather than in a scenario where we would see age-related progress in narrative competence as a result of cumulative experience from a more conducive socio-communicative environment as children grow older.

## Conclusion

Although there are a growing number of studies examining the left-behind children in rural areas of China, very few studies have examined these children's home language development. This study makes a first attempt to fill this gap by focusing on expressive narrative macrostructure abilities in their home language. We document that left-behind experience negatively predicted children's narrative competence, and foundational lexical and morphosyntactic abilities positively predicted children's narrative competence, while chronological age was not a significant predictor. Children growing up with both parents absent scored significantly lower than those growing up with one parent. More educated caregivers are associated with better narrative competence. This study has several limitations and these limitations should be considered in future research. First, the sample size is relatively small and future research should include more participants. Second, we had limited information regarding influence from other people whom children have immediate contact with, including teachers at school, classmates, playmates in the village, etc. Apart from the caretakers, these people also have potential influence on children's language development. This information should be collected in future studies.

Our findings offer some important implications for policies and practices that are pertinent to this group of disadvantaged population. The strikingly low number of non-textbooks these children have at home and the low frequency of home literacy activities such as storytelling at home warrant public attention. We hope documenting these findings could be informative to parents, educators, and policymakers as they reflect on how they can better support the language development of these left-behind children. Moreover, our study is the first to investigate oral narratives in the under-investigated language Kam and thus might have important implication for language teaching and education in ethnic minorities in China. Last but not least, our results could contribute to preserving indigenous languages and cultures which are critical to making our the world more sustainable and diverse.

## Data availability statement

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

## Ethics statement

The studies involving human participants were reviewed and approved by the Human Subjects Ethics Sub-committee at the Hong Kong Polytechnic University (reference number: HSEARS20190916002). Written informed consent to participate in this study was provided by the participants' legal guardian/next of kin.

## Author contributions

WY, AC, and NG participated in the design of this study and interpretation of the data and drafted the manuscript and revised it critically and performed the final edits. WY was responsible for data collection, data coding, and data analyses. All authors contributed to the article and approved the submitted version.

## Funding

This study was supported by a research stipend by the Fritz Thyssen Foundation to WY (Ref. 40.20.0.002SL, PI: Yang).

## Acknowledgments

We thank Weixian Yang, Yongdeng Li, Kuiyi Li, Liting Wang for help as research assistants, and Yufeng Meng, Caihong Yang, Binzi Wang, Hulian Yang as informants of the Kam language. We are grateful to all the families and children participated in this resrch for their most active cooperation.

## Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

## Publisher's note



## References

Armon-Lotem, S., Walters, J., and Gagarina, N. (2011). The impact of internal and external factors on linguistic performance in the home language and in L2 among Russian-Hebrew and Russian-German preschool children. *Linguist. Approaches Biling.* 1, 291–317. doi: 10.1075/lab.1.3.04arm

Bates, D., Maechler, M., Bolker, B., and Walker, S. (2015). Fitting linear mixed-effects models using lme4. *J. Stat. Softw.* 67, 1–48. doi: 10.18637/jss.v067.i01

Bitetti, D., and Hammer, C. S. (2016). The home literacy environment and the English narrative development of Spanish–English bilingual children. *J. Speech Lang. Hear. Res.* 59, 1159–1171. doi: 10.1044/2016_JSLHR-L-15-0064

Bohnacker, U. (2016). Tell me a story in English or Swedish: narrative production and comprehension in bilingual preschoolers and first graders. *Appl. Psycholinguist.* 37, 19–48. doi: 10.1017/S0142716415000405

Bohnacker, U., Lindgren, J., and Öztekin, B. (2021). Storytelling in bilingual Turkish-Swedish children: effects of language, age and exposure on narrative macrostructure. *Linguist. Approaches Biling.* 12, 413–445. doi: 10.1075/lab.20057.boh

Ding, K., Li, C., Jia, H., Zhang, M., and Yu, D. (2021). Is left-behind a real reason for children's social cognition deficit? An fNIRS study on the effect of social interaction on left-behind preschooler's prefrontal activation. *PLoS One* 16:e0254010. doi: 10.1371/journal.pone.0254010

Dixon, L. Q., Zhao, J., Quiroz, B. G., and Shin, J. Y. (2012). Home and community factors influencing bilingual children's MTL vocabulary development. *Int. J. Biling.* 16, 541–565. doi: 10.1177/1367006911429527

Fiani, R., Henry, G., and Prévost, P. (2021). Macrostructure in narratives produced by Lebanese Arabic-French bilingual children: developmental trends and links with language dominance, exposure to narratives and lexical skills. *Linguist. Approaches Biling.* 12, 446–478. doi: 10.1075/lab.20035.fia

Gagarina, N. (2016). Narratives of Russian–German preschool and primary school bilinguals: Rasskaz and Erzaehlung. *Appl. Psycholinguist.* 37, 91–122. doi: 10.1017/S0142716415000430

Gagarina, N., Klop, D., Kunnari, S., Tantele, K., Välimaa, T., Balčiūnienė, I., et al. (2015). "Assessment of narrative abilities in bilingual children" in *Language Impairment Testing in Multilingual Settings*. eds. S. Armon-Lotem, J. Jong and N. Meir (Amsterdam: John Benjamins), 241–274.

Gagarina, N., Klop, D., Kunnari, S., Tantele, K., Välimaa, T., Bohnacker, U., et al. (2019). MAIN: Multilingual Assessment Instrument for Narratives – Revised. *ZAS Papers in Linguistics* 63, 1–36. doi: 10.21248/zaspil.63.2019.516

Gollan, T. H., Weissberger, G. H., Runnqvist, E., Montoya, R. I., and Cera, C. M. (2012). Self-ratings of spoken language dominance: a multilingual naming test (MINT) and preliminary norms for young and aging Spanish–English bilinguals. *Biling. Lang. Congn.* 15, 594–615. doi: 10.1017/S1366728911000332

Han, J. L., Yong, G., Yan, Z., and Han, C. M. (2017). Urban-rural extension: urban-rural reproduction among different groups of children. *Chin. Educ. Soc.* 50, 315–335. doi: 10.1080/10611932.2017.1382130

Hayward, D., and Schneider, P. (2000). Effectiveness of teaching story grammar knowledge to preschool children with language impairment: an exploratory study. *Child Lang. Teach. Ther.* 16, 255–284. doi: 10.1177/026565900001600303

Heilmann, J., Miller, J. F., Nockerts, A., and Dunaway, C. (2010). Properties of the narrative scoring scheme using narrative retells in young school-age children. *Am. J. Speech Lang. Pathol.* 19, 154–166. doi: 10.1044/1058-0360(2009/08-0024)

Henrich, J., Heine, S., and Norenzayan, A. (2010). The weirdest people in the world? *Behav. Brain Sci.* 33, 61–83. doi: 10.1017/S0140525X0999152X

Hu, B. Y., Wu, H., Winsler, A., Fan, X., and Song, Z. (2020). Parent migration and rural preschool children's early academic and social skill trajectories in China: are 'left-behind'children really left behind? *Early Child. Res. Q.* 51, 317–328. doi: 10.1016/j.ecresq.2019.12.011

Iluz-Cohen, P., and Walters, J. (2012). Telling stories in two languages: narratives of bilingual preschool children with typical and impaired language. *Biling. Lang. Congn.* 15, 58–74. doi: 10.1017/S1366728911000538

Ivanova, I., Salmon, D. P., and Gollan, T. H. (2013). The multilingual naming test in Alzheimer's disease: clues to the origin of naming impairments. *J. Int. Neuropsychol. Soc.* 19, 272–283. doi: 10.1017/S1355617712001282

Kan, R. T., Chan, A., and Gagarina, N. (2020). Investigating children's narrative abilities in a Chinese and multilingual context: Cantonese, Mandarin, Kam and Urdu adaptations of the Multilingual Assessment Instrument for Narratives (MAIN). *Front. Psychol.* 11:573780. doi: 10.3389/fpsyg.2020.573780

Kidd, E., and Garcia, R. (2022). How diverse is child language acquisition research? *First Lang.* 42, 703–735. doi: 10.1177/01427237211066405

Lambert, W. E., and Taylor, D. M. (1996). Language in the lives of ethnic minorities: Cuban–American families in Miami. *Appl. Linguis.* 17, 477–500. doi: 10.1093/applin/17.4.477

Lindgren, J. (2018). *Developing narrative competence. Swedish, Swedish-German and Swedish-Turkish Children aged 4–6. Studia Linguistica Upsaliensia 19*. Uppsala: Acta Universitatis Upsaliensis.

Lindgren, J., and Bohnacker, U. (2020). Vocabulary development in closely-related languages: age, word type and cognate facilitation effects in bilingual Swedish-German preschool children. *Linguist. Approaches Biling.* 10, 587–622. doi: 10.1075/lab.18041.lin

Lindgren, J., and Bohnacker, U. (2021). How do age, language, narrative task, language proficiency and exposure affect narrative macrostructure in German-Swedish bilingual children aged 4 to 6? *Linguist. Approaches Biling.* 12, 479–508. doi: 10.1075/lab.20020.lin

Liu, Y., Yang, X., Li, J., Kou, E., Tian, H., and Huang, H. (2018). Theory of mind development in school-aged left-behind children in rural China. *Front. Psychol.* 9:1819. doi: 10.3389/fpsyg.2018.01819

Lu, Y. (2012). Education of children left behind in rural China. *J. Marriage Fam.* 74, 328–341. doi: 10.1111/j.1741-3737.2011.00951.x

Lu, Y., Zhang, R., and Du, H. (2021). Family structure, family instability, and child psychological well-being in the context of migration: evidence from sequence analysis in China. *Child Dev.* 92, e416–e438. doi: 10.1111/cdev.13496

Marinis, T., and Armon-Lotem, S. (2015). "Sentence repetition" in *Methods for assessing multilingual children: Disentangling bilingualism from language impairment*. eds. S. Armon-Lotem, J. Jong and N. Meir (Bristol, UK: Multilingual Matters). 95–124.

Maviş, I., Tunçer, M., and Gagarina, N. (2016). Macrostructure components in narrations of Turkish–German bilingual children. *Appl. Psycholinguist.* 37, 69–89. doi: 10.1017/S0142716415000429

National Bureau of Statistics of China, UNICEF China, UNFPA China (2017). "Population Status of Children in China in 2015: Facts and Figures" Available at: https://www.unicef.cn/en/reports/population-status-children-china-2015 (Accessed September 30, 2022).

O'neill, D. K., Pearce, M. J., and Pick, J. L. (2004). Preschool children's narratives and performance on the Peabody individualized achievement test–revised: evidence of a relation between early narrative and later mathematical ability. *First Lang.* 24, 149–183. doi: 10.1177/0142723704043529

Oakhill, J. V., and Cain, K. (2012). The precursors of reading ability in young readers: evidence from a four-year longitudinal study. *Sci. Stud. Read.* 16, 91–121. doi: 10.1080/10888438.2010.529219

Office of Leading Group of the State Council for the Seventh National Population Census (2021). *Major Figures on 2020 Population Census of China*. Beijing: China Statistic Press.

Pace, A., Luo, R., Hirsh-Pasek, K., and Golinkoff, R. M. (2017). Identifying pathways between socioeconomic status and language development. *Ann. Rev. Linguist.* 3, 285–308. doi: 10.1146/annurev-linguistics-011516-034226

Paradis, J. (2011). Individual differences in child English second language acquisition: comparing child-internal and child-external factors. *Linguist. Approaches Biling.* 1, 213–237. doi: 10.1075/lab.1.3.01par

R Core Team (2022). R: A Language and Environment for Statistical Computing. Available at: https://www.R-project.org/. (Accessed September 15, 2022).

Ratner, B. (2009). The correlation coefficient: its values range between +1/−1, or do they? *J. Target. Meas. Anal. Mark.* 17, 139–142. doi: 10.1057/jt.2009.5

Roch, M., Florit, E., and Levorato, C. (2016). Narrative competence of Italian–English bilingual children between 5 and 7 years. *Appl. Psycholinguist.* 37, 49–67. doi: 10.1017/S0142716415000417

Rodina, Y. (2017). Narrative abilities of preschool bilingual Norwegian-Russian children. *International Journal of Bilingualism* 21, 617–635.

Sun, H., Ng, S. C., O'Brien, B. A., and Fritzsche, T. (2020). Child, family, and school factors in bilingual preschoolers' vocabulary development in heritage languages. *J. Child Lang.* 47, 817–843. doi: 10.1017/S0305000919000904

Sun, H., Steinkrauss, R., Tendeiro, J., and de Bot, K. (2016). Individual differences in very young children's English acquisition in China: internal and external factors. *Biling. Lang. Congn.* 19, 550–566. doi: 10.1017/S1366728915000243

Sun, H., Steinkrauss, R., Wieling, M., and de Bot, K. (2018). Individual differences in very young Chinese children's English vocabulary breadth and semantic depth: internal and external factors. *Int. J. Biling. Educ. Biling.* 21, 405–425. doi: 10.1080/13670050.2016.1178706

Sun, H., Waschl, N., and Veera, R. (2022). Language experience and bilingual Children's heritage language learning. *Stud. Second. Lang. Acquis.* 1-28, 1–28. doi: 10.1017/S0272263121000942

Swanson, L., Fey, M., Mills, C., and Hood, L. (2005). Use of narrative-based language intervention with children who have specific language impairment. *Am. J. Speech Lang. Pathol.* 14, 131–143. doi: 10.1044/1058-0360(2005/014)

The State Council of the People's Republic of China (2016). *Opinions of the State Council on Strengthening the Work of Caring for the Left Behind Children in Rural Areas*. Beijing: The State Council.

Uccelli, P., and Páez, M. M. (2007). Narrative and vocabulary development of bilingual children from kindergarten to first grade: developmental changes and associations among English and Spanish skills. *Lang. Speech Hear. Serv. Sch.* 38, 225–236. doi: 10.1044/0161-1461(2007/024)

Wang, L., and Mesman, J. (2015). Child development in the face of rural-to-urban migration in China: a meta-analytic review. *Perspect. Psychol. Sci.* 10, 813–831. doi: 10.1177/1745691615600145

Wen, M., and Lin, D. (2012). Child development in rural China: children left behind by their migrant parents and children of nonmigrant families. *Child Dev.* 83, 120–136. doi: 10.1111/j.1467-8624.2011.01698.x

Wu, M. X. (2018). *A Grammar of Sanjiang Kam*. Muenchen: LINCOM Europa.

Yang, T. Y. (2017). *A Grammar of Kam Revealed in Its Narrative Discourse*. Singapore: Springer.

Yang, W. C., Chan, A., and Gagarina, N. (2020). The multilingual assessment instrument for narratives (MAIN): adding Kam to MAIN. *ZAS Papers Linguist.* 64, 147–151. doi: 10.21248/zaspil.64.2020.567

frontiers | Frontiers in Psychology

TYPE Original Research
PUBLISHED 30 January 2023
DOI 10.3389/fpsyg.2023.1059298



OPEN ACCESS

EDITED BY
He Sun,
Nanyang Technological University,
Singapore

REVIEWED BY
Marco-Antonio García-Flores,
Meritorious Autonomous University of Puebla,
Mexico
Limin (Tony) Qin,
University of Jinan,
China

*CORRESPONDENCE
Emily Mak
✉ eomak@ucdavis.edu

SPECIALTY SECTION
This article was submitted to
Language Sciences,
a section of the journal
Frontiers in Psychology

RECEIVED 01 October 2022
ACCEPTED 09 January 2023
PUBLISHED 30 January 2023

CITATION
Mak E, Nichiporuk Vanni N, Yang X, Lara M, Zhou Q and Uchikoshi Y (2023) Parental perceptions of bilingualism and home language vocabulary: Young bilingual children from low-income immigrant Mexican American and Chinese American families.
*Front. Psychol.* 14:1059298.
doi: 10.3389/fpsyg.2023.1059298



# Parental perceptions of bilingualism and home language vocabulary: Young bilingual children from low-income immigrant Mexican American and Chinese American families

Emily Mak[1]*, Natasha Nichiporuk Vanni[1], Xintong Yang[1], Maria Lara[1], Qing Zhou[2] and Yuuko Uchikoshi[1]

[1]School of Education, University of California, Davis, Davis, CA, United States, [2]Department of Psychology, University of California, Berkeley, Berkeley, CA, United States

Dual language learners (DLLs), especially those from immigrant families in the United States, risk losing their home language as they gradually shift to speaking English as they grow up. Given the potential benefits of bilingualism on children's cognitive, linguistic, and social–emotional development, it is crucial to maintain children's home language to foster bilingual development. The current literature suggests that parental beliefs toward bilingualism and the language and literacy environment are linked to children's language development. With the growing number of DLLs living in the United States, little is known about what parental beliefs about bilingualism of their children are integrated into these bilingual households and parents' role in home language maintenance. The present study addresses the gap in the literature by investigating low-income immigrant families, specifically Chinese American and Mexican American families, and exploring the parental perceptions of children's bilingual language learning. Further, the present study examines the relations among parental perceptions of bilingualism, home language and literacy practices, and home language oral proficiency. Data were collected from a total of 41 Mexican American and 91 Chinese American low-income immigrant families with DLLs ages 50–88 months who had been recruited from Head Start programs and state-funded preschools in Northern California when the children were 3–4 years old. Information about shared reading frequency, home language exposure and usage, and parental perceptions of bilingualism was collected through parental interviews, and DLLs' home language oral proficiency was individually assessed. No significant difference in home language oral proficiency was observed between the two groups. Principal Components Analysis on the parental perceptions of bilingualism measure revealed two components, "Importance of Being Bilingual" and "English over Bilingualism." Stepwise regression analysis results show that "Importance of Being Bilingual" was associated with children's home language oral proficiency after controlling for culture, child age, the frequency of home language shared book reading, and child home language exposure and use. The results show that parents' positive beliefs toward bilingualism are related to the children's use of that language and their children's language outcomes. Implications and suggestions for home language and literacy support for DLLs are discussed.

KEYWORDS

**dual language learners, home language and literacy environment, perceptions of bilingualism, oral proficiency, low-income, immigrant families**

## Introduction

Dual language learners (DLLs) are defined as children who are learning two or more languages simultaneously at home (Espinosa, 2013). The rate of DLLs continues to grow, making up 32% of all children in the United States (Chung et al., 2019). An analysis of 26 states in the United States reported that DLLs make up 25.5% of their enrolled population in preschool programs, more than the general population (National Clearinghouse for English Language Acquisition, 2019). California reports that more than 40% of those enrolled in their state-funded preschool programs were DLLs (National Clearinghouse for English Language Acquisition, 2022). The predominant language spoken at home by DLLs is Spanish, accounting for three-quarters of DLLs' early learning programs in California, followed by Mandarin and Cantonese, respectively (Brodziak et al., 2021). The percentage of DLLs who speak Chinese has grown by approximately 35% over the past eight years, and Chinese is the second most common home language in the United States (Batalova et al., 2021; Mitchell, 2020).

There are family factors that influence DLLs' language and literacy development, such as parental involvement, family structure, and the quality of exposure to languages in the home (Portes and MacLeod, 1996). Findings also suggest that other demographic factors, such as parental education and socioeconomic status, influence the home language environment seeing as many DLLs live in poverty (Capps et al., 2005; Haft et al., 2021). Furthermore, parents of DLLs have varying acculturation beliefs, which may influence their choices in raising their bilingual children (Schwartz et al., 2010). DLLs, especially those from immigrant families, risk losing their home language as they enroll in schools and commonly use English (Nesteruk, 2010). Consequently, families may engage in different language and literacy practices to maintain their DLL children's home language skills (Zhang and Slaughter-Defoe, 2009; García et al., 2012).

Few studies have investigated the relationship between parents' beliefs toward bilingualism of their children and how that influences the home literacy environment and children's bilingual attainment. Previous literature explains that bilingual development becomes conflictive when there are negative attitudes toward bilingualism and in some cases even the language itself; in such case, conflict instead of harmony in interpersonal interactions may result from subjective well-being (Veenhoven, 2008; De Houwer, 2013). The three-tier model of De Houwer (1999) describes how parents' attitudes and beliefs, along with parents' linguistic interactions and choices, result in the state of the child's language development. To further examine these relationships, the present study examines parental perceptions of children's bilingual language learning in low-income immigrant families, specifically Chinese American and Mexican American families.

## Theoretical framework

Previous research shows that parents play an essential role in a child's language development (Taylor, 1983; García et al., 2012). A child's first exposure to language occurs in the home, helping lay the foundation for the child's literacy development. The family literacy theory states that the family is essential in developing the child's emerging language and literacy skills (Taylor, 1983; García et al., 2022). Furthermore, parent involvement in their children's learning and development has been found to positively impact academic achievement, frequently even more than the family's socioeconomic status (Amatea, 2013). For DLLs, parental choice and frequency of language use influence their child's bilingual development. As children enter schools in the United States, English becomes dominant in the child's life, and home language exposure and development may only happen in the house.

Furthermore, the home literacy model states that children's oral language and early literacy development are influenced by literacy activities at home (Sénéchal et al., 1998). Shared book reading allows parents to transfer knowledge and literacy skills to their children (Dexter and Stacks, 2014). A large body of research supports the positive effects of shared reading on children's oral language outcomes, such as vocabulary and narrative skills (e.g., Sénéchal et al., 2008; Lever and Sénéchal, 2011; Malin et al., 2014; Lewis et al., 2016; Wasik et al., 2016; Gámez et al., 2017). More recently, the quantity of these opportunities, including the amount of language input, has been found to be associated with growth in the vocabulary of the two languages of bilinguals (Goodrich et al., 2021).

Moreover, Bronfenbrenner's ecological systems theory suggests that the microsystem, which involves a child's direct and immediate interactions with the environment and persons, including parents, siblings, teachers, and peers, serves as a proximal source for child learning and development (Bronfenbrenner, 2005; Goodrich et al., 2021). When children are young, they are mainly influenced by their home environment composed of their family members. Notably, parents have a significant effect on their children. In the home environment, parents expose children to the home language as well as the community language. Parents choose the home language and literacy environment with language activities and print opportunities that may assist in developing their vocabulary and understanding of language (Tunmer and Hoover, 1992).

## Parental perceptions of bilingualism and home language development

Parental beliefs toward bilingualism are linked to the language they use with their children at home and the school programs and language classes they let their children participate in (Wei, 2011). Many previous research articles show that the vast majority of Mexican American and Chinese American parents want their children to be bilingual and maintain their home language (e.g., Lao, 2004; Zhang, 2004, 2010; Scott, 2011; Portes and Rumbaut, 2014; Surrain, 2021; Hwang et al., 2022). Some reasons include heritage preservation, communication, and better career paths. Often, due to the lack of parental English abilities, immigrant parents cannot create a bilingual environment at home and are dependent on the schools to teach their children English (Oladejo, 2006; Chang, 2008).

Research has found that language practices at home can aid children's language acquisition and development. Through a single mediator model, Ronderos et al. (2022) surveyed Spanish-English bilingual families and found a correlation between parental beliefs in Spanish leading to Spanish language outcomes and the same results for English. The ability to practice shared reading and language use at home could benefit the performance of that language outside of the home environment, making it easier to preserve the home language or grasp a new language. Children spend most of their time at school or with a parent. The parental perceptions of bilingualism as a positive trait can have a great influence on the success of fluent bilingual ability.

Recent research showed that most immigrant parents support bilingual education (Chang, 2008; Wei, 2011; Lau and Richards, 2021).

Their reasons are focused on the hope that their children can develop a sense of national identity with their cultural roots, be able to communicate in the home language with older generations, and gain more job opportunities when they enter society (e.g., Tseng and Fuligni, 2000; Lao, 2004; Surrain, 2021; Hwang et al., 2022). Some parents only regard English as a tool; they think the home language is essential in forming meaningful relationships that maintain family ties (Oh and Fuligni, 2010). However, because children have lived in an English environment for a long time, they have spent more time systematically learning English. Some parents do not know how to create a home language environment for children to learn at home, which leads to their lack of vocabulary in the home language (Oladejo, 2006; Chang, 2008).

To become bilingual, DLLs' home language needs to be maintained and developed, and family, particularly parents, play a significant role in home language maintenance in immigrant families (Guardado, 2002; Lutz, 2008; Brown, 2011; Park, 2013; Melo-Pfeifer, 2015). Research has shown that home language development is connected to children's personal, cultural, and historical backgrounds and is vital for children's development (Valdéz, 2001). Immigrant DLLs in the United States risk losing their home language as they gradually shift to speaking English more often when they begin school (Nesteruk, 2010; Portes and Rumbaut, 2014). Losing the home language may impair DLLs' ethnic identity and even bonds with their families (Wong Fillmore, 2000; Lee, 2002; Oh and Fuligni, 2010; Ennser-Kananen, 2012; Mu, 2015). In addition, it may hinder DLL children's relationships with their immigrant family members who speak only the home language (Qin, 2006).

Families also want to preserve their heritage and give their children the root of their culture (Zhang, 2010; Scott, 2011; Lee et al., 2015; Rosas, 2015; Surrain, 2021; Hwang et al., 2022). Parents state that heritage preservation is one of the reasons why bilingualism is advocated for, especially in families with home ties to their home countries (Farruggio, 2005). Because the older generation usually can only speak the home language, some parents report that they would feel embarrassed when their children cannot talk or understand the home language with the older generation in the family. Some parents only speak the home language, so they continue communicating with their children in the home language and hope their children will do the language brokering for them (Lee et al., 2015).

Parents of immigrant families put efforts into maintaining and instilling their DLL children's home language skills as they are aware of the risk of home language attrition in their children (García et al., 2022). These parents generally have a positive attitude toward home language maintenance but may have different expectations and emphases in their children's home language development (Liang, 2018). As the home language may be at risk in the absence of formal educational support, some parents enroll their children in home language education programs, while some employ home language policies at home and deliberately teach the language themselves (King et al., 2008; Curdt-Christiansen, 2009; Zhang and Slaughter-Defoe, 2009). One way of maintaining the home language is through shared book reading, where an adult reads a book with a child, exposes children to novel words, and transfers adults' knowledge and literacy skills to the children (Wasik and Bond, 2001; Dexter and Stacks, 2014). Research has shown that shared book reading enhances children's vocabulary knowledge (Wasik et al., 2016). Furthermore, a large body of research demonstrated the positive relations between parent–child shared book reading and language and literacy skills in young monolingual and bilingual children (e.g., Danis et al., 2000; DeTemple, 2001; Hindman et al., 2012; Leech and Rowe, 2014; Luo et al., 2021). These studies demonstrated that when parents engage their children in shared book reading by labeling, asking questions, and making comments, children are able to develop their language and literacy skills further. Often during shared book reading, parents discuss concepts uncommonly discussed in children's daily lives and thus promote vocabulary and literacy skills in young children (Hindman et al., 2012). In addition, there is evidence that the home language use during parent–child shared book reading promotes home language development among bilingual preschoolers (e.g., Sun, 2019; Sun et al., 2022a).

In addition, bilingual practices and opportunities for exposure may depend on the family's socioeconomic status. Immigrant parents may be unable to support the new language due to their own language barriers (Leyendecker et al., 2018). It was found that low-income families use their home language more than the English language with their children (Williams et al., 2019; Haft et al., 2021). Therefore, home language input may vary across families for these DLL children. Moreover, home language input from parents was found to be positively related to young DLLs' home language outcomes (Dixon et al., 2012; Mori and Calder, 2017; Sun et al., 2020). Language input and output should be treated equally as a learning process for DLL children. According to the input hypothesis, language input is traditionally seen as a key component for children when learning a new language (Krashen, 1985). However, recent research has begun recognizing children's language output as another unique contributor to bilingual language development (e.g., Bohman et al., 2010; Bedore et al., 2016; Ribot et al., 2018). The importance of language output in bilingual language learning is supported by the output hypothesis (Swain, 2005). According to the output hypothesis, other than language exposure, being able to produce the target language actively and getting confirmation or negative feedback from more proficient speakers are vital to learning a second language. A recent study showed that that both home language input and output of the child significantly predicted the home language proficiency in bilingual kindergarteners (Sun et al., 2022b). Thus, the relationships between DLLs' language input and output and oral language proficiency are examined in this present study. Most previous studies on DLLs' home language and literacy have focused on English language outcomes. More research is needed on DLL children's home language development and their language and literacy environment, including the quantity of language input and output.

## Present study

Given the benefits of maintaining the home language for DLLs' development, the present study aimed to investigate the relationships among parental perceptions of bilingualism for their child, home language and literacy environment, and home language vocabulary outcomes among low-income immigrant DLL children of Mexican American and Chinese American families. First, the associations between perceptions of bilingualism and the home language and literacy environment were examined. It was hypothesized that parental perceptions of bilingualism would be related to children's home language and literacy environment. Next, the associations between perceptions of bilingualism, home language and literacy environment, and home language vocabulary were examined. It was expected that parents' perceptions of bilingualism and the home language and literacy environment would be positively associated with DLLs' home language vocabulary.

# Materials and methods

## Participants

A total of 132 DLLs from low-income immigrant families were recruited from Head Start centers and state-funded preschools in Northern California from Fall 2018 to Fall 2019 (Time 1). These children were ages 3–4 when they were recruited through parent meetings and drop-off times during regular school hours at Time 1. Follow-up data collection was conducted 1.5 years later, from Fall 2020 to Fall 2021 (Time 2). Data from Time 2 will be used and discussed in this study.

At Time 2, Mexican American DLLs' ages ranged from 50 to 88 ($M = 67.19$; $SD = 9.18$), and Chinese American DLLs' ages ranged from 52 to 88 months ($M = 71.27$; $SD = 5.89$). 46.34% of the Mexican American DLLs and 56.04% of Chinese American DLLs were boys. The average Mexican American maternal educational years was 11.76 years (range = 8–18; $SD = 3.08$), and the average Chinese American maternal educational years was 12.76 years (range = 8–18; $SD = 2.40$). The average Mexican American family *per capita* income in the previous year, calculated by total family household income divided by household size, was US$9,320.41 (range = US$1,500–$24,375; $SD$ = US$5,390.98), and the average Chinese American family *per capita* income in the previous year was US$9,634.20 (range = US$1,000–$29,166.67; $SD$ = US$6,572.93).

## Measures

### Parental perceptions of bilingualism

Parental perceptions of bilingualism for one's child were measured using the Perceptions of Bilingualism for Child Plus scale (PoB+; Luk and Surrain, 2019). This eight-item scale was designed to measure parents' perceptions of the value of bilingualism for their DLL children. The eight questions asked parents about the benefits and potential costs of bilingualism for their children, with two items being reverse-coded. Each question was translated into Spanish and Chinese. The questions were asked on a six-point Likert scale from 1 (strongly disagree) to 6 (strongly agree). The Cronbach's alpha of the eight questions was 0.77. See Table 1 for a list of questions. The inverse of the reverse coded items (Questions 5 and 7) of the PoB+ was used.

### Parental language input and child language output

The parental language input and child language output questionnaire was adapted from the Bilingual Input–Output Survey (BIOS; Peña et al., 2014). Parents reported on the hour-by-hour language input and the child's language output of English and the home language in the home for any typical weekdays and weekends. The relative percentages of hours of home language parent input and child output compared to English were used for data analysis.

### Shared reading frequency

Parents reported on the shared reading frequency in the home language with their child in the home on a six-point Likert scale (0 = *never*, 1 = *once a month*, 2 = *2–4 times a month*, 3 = *once a week*, 4 = *2–3 times a week*, and 5 = *every day*) adapted from Hammer et al. (2003).

### Home language vocabulary

Home language vocabulary was measured by the Vocabulario Sobre Dibujos (Picture Vocabulary) subtest from the *Woodcock-Johnson, 4th Edition, Tests of Oral Language* (Schrank et al., 2014). In this task, children were asked to identify objects presented to them in pictures by providing single-word answers in their home language (i.e., Spanish or Chinese). There were 54 test items in total. All children started from the first item and stopped when they responded incorrectly to the last six items consecutively. The median test reliability for Spanish at age 6 is 0.88 (Wendling et al., 2019).

The Chinese version of the Picture Vocabulary subtest was translated from the Spanish subtest and verified by language experts, which has been done in previous studies (e.g., Uchikoshi, 2013; Chung et al., 2019; Chernoff et al., 2021; Uchikoshi et al., 2022). The alpha reliabilities in Chinese for our sample was 0.90. Raw scores were used for both Mexican American and Chinese American participants as there were no standardized scores for the Chinese American population in the United States.

## Data analysis

First, Shapiro–Wilk tests were run to check for normality for all variables. Then, Mann–Whitney tests were used to compare non-normally distributed dependent variables between the Mexican American and Chinese American groups. Kendall's correlations were conducted to examine the relations between all variables. The PoB+ data were also examined and evaluated with Principal Component Analysis. Finally, stepwise regression analysis was used to examine the unique associations between parental perceptions of bilingualism and children's home language proficiencies. The descriptive statistics were computed using RStudio Version 1.4.1717 (RStudio Team, 2021), and the Principal

TABLE 1 List of perceptions of bilingualism for child plus scale questions, means, and standard deviations ($N$=132).

| | | *M* | *SD* |
|---|---|---|---|
| 1 | It is important for my child to speak more than one language. | 5.50 | 1.07 |
| 2 | Speaking more than one language will help my child succeed in school in the long term. | 5.53 | 0.90 |
| 3 | It is important for my child to learn to read and write more than one language. | 5.61 | 0.75 |
| 4 | Speaking more than one language will help my child compete in the job market. | 5.66 | 0.71 |
| 5 | My child will be confused if he or she learns two languages at the same time. | 4.27 | 1.50 |
| 6 | Speaking more than one language will help my child become a stronger thinker. | 4.94 | 1.26 |
| 7 | To be successful, the only language my child needs to speak well is English. | 4.76 | 1.21 |
| 8 | Speaking more than one language will help my child understand people from different cultural backgrounds. | 5.41 | 1.02 |

M, mean; SD, standard deviation; items 5 and 7 were reverse coded.

TABLE 2 Descriptive statistics of study variables.

| | *N* | *M* | *SD* | Min | Max | Skewness | Kurtosis |
|---|---|---|---|---|---|---|---|
| Child Age (Months) | 128 | 70.02 | 7.27 | 50 | 88 | −0.34 | 0.67 |
| HL Shared Reading | 132 | 2.71 | 1.86 | 0 | 5 | −0.35 | −1.43 |
| Parent HL Input | 128 | 0.49 | 0.19 | 0 | 1 | 0.03 | 0.11 |
| Child HL Output | 128 | 0.46 | 0.22 | 0 | 1 | 0.02 | 0.18 |
| HL Picture Vocabulary | 122 | 14.62 | 6.94 | 0 | 30 | −0.22 | −0.50 |

M, mean; SD, standard deviation; and HL, home language. Raw scores were used for picture vocabulary.

TABLE 3 Correlation among the study variables.

| Variables | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| 1. Culture | – | | | | | | | |
| 2. Child Age | −0.26** | – | | | | | | |
| 3. Parent HL Input | −0.07 | −0.04 | – | | | | | |
| 4. Child HL Output | −0.08 | −0.08 | 0.76*** | – | | | | |
| 5. Importance of Being Bilingual | −0.25** | −0.01 | −0.06 | −0.05 | – | | | |
| 6. English over Bilingualism | −0.44*** | −0.33*** | 0.09 | 0.11 | 0.00 | – | | |
| 7. HL Shared Reading | −0.25** | 0.001 | 0.11 | 0.10 | 0.26** | 0.11 | – | |
| 8. HL Picture Vocabulary | −0.07 | 0.18* | 0.11 | 0.19* | 0.33*** | 0.07 | 0.36*** | – |

HL, home language; *$p < 0.05$, **$p < 0.01$, and ***$p < 0.001$.

Component Analysis and stepwise regression analysis were conducted using IBM SPSS Statistics for Macintosh, Version 28.0 (IBM Corp, 2020).

# Results

The descriptive statistics of the study variables are presented in Table 2. The average frequency of parent–child shared book reading in the home language was 2.71, which can be interpreted to be roughly less than once a week. The standard deviation was 1.86, meaning there were variations in how often the parents read to their children in our sample. Some parents never read, while some read every day. The average percentages of parent home language input and child home language output were 49 and 46%, respectively. This indicates an equal amount of home language and English was spoken in the home of these immigrant families. The mean raw score of Picture Vocabulary in the home language was 14.62 with some variations (range = 0–30; $SD = 6.94$). No significant difference in Picture Vocabulary scores was observed between the Mexican American and Chinese American groups. Table 3 presents the correlations between all study variables. Parent home language output and shared reading frequency in the home language were positively correlated with Picture Vocabulary in the home language.

## Parental perceptions of bilingualism

Mean values of the PoB+ are stated in Table 1. Questions 1, 2, 3, 4, and 8 all had mean scores of around 5.5 on a scale of 1 (strongly disagree) to 6 (strongly agree). Question 6 was slightly under 5, indicating that the majority of parents agreed. In general, parents believed that it was important for their children to become bilingual and biliterate to succeed in school and compete in the job market, as well as become more culturally competent and strong thinkers.

The factorability of the PoB+ data was examined. All eight items correlated at least 0.3 with at least one other item, suggesting reasonable factorability. Principal Components Analysis with varimax rotation on the eight items indicated two components with an Eigenvalue >1. The Kaiser-Meyer-Olkin measure of sampling adequacy was 0.84, which is higher than the recommended value of 0.6. Further, Bartlett's test of sphericity was significant [$\chi^2(28) = 443.65$, $p < 0.001$]. Six items loaded onto Component 1: (item 1 importance of being bilingual, item 2 success in school, item 3 importance of being biliterate, item 4 success in the job market, item 6 stronger thinker, and item 8 understanding other cultures). Two items loaded on Component 2 (item 5 confusion between two languages and item 7 English over other languages). The first principal component addressed parents' perception of the "Importance of Being Bilingual," and the second principal component addressed parents' perception of "English over Bilingualism." Internal consistency for both of the scales was examined using Cronbach's alpha. The alphas were 0.86 for "Importance of Being Bilingual" (six items) and 0.56 for "English over Bilingualism" (two items).

## Stepwise regression analysis

To account for possible multicollinearity effects among variables, stepwise regression analyses were conducted. The model was specified to determine associations among parental perceptions of bilingualism for their child, home language and literacy environment, and home language vocabulary outcomes. Specifically, the two components of parental perceptions of bilingualism ("Importance of Being Bilingual" and "English over Bilingualism"), culture, child age, home language exposure and usage, and home language reading frequency were entered into the model to find the best fitting model. The estimates of the unstandardized regression coefficients, standardized regression coefficients, and $R^2$ values of the final model are reported in Table 4.

TABLE 4 Stepwise regression analysis predicting home language oral proficiency.

| | *B* | β | *SE* |
|---|---|---|---|
| Importance of Being Bilingual | 1.92*** | 0.28 | 0.58 |
| HL Shared Reading | 0.99** | 0.27 | 0.31 |
| Child HL Output | 6.36* | 0.20 | 2.59 |
| Child Age (Months) | 0.19* | 0.20 | 0.08 |
| Constant | −4.22 | | 5.67 |
| $R^2$ | | 0.26 | |
| Adjusted $R^2$ | | 0.24 | |
| *F* | | 10.16*** | |

HL, home language; B, unstandardized regression coefficients; β, standardized regression coefficients, SE = standard error; *$p < 0.05$, **$p < 0.01$, and ***$p < 0.001$.

The final model explained 23.5% of the variance in home language oral proficiency as measured with Picture Vocabulary. "Importance of Being Bilingual" was associated with home language oral proficiency. "English over Bilingualism" was not associated with home language oral proficiency. As predicted, child age was also associated with home language oral comprehension. An increase in age was associated with higher home language oral proficiency. Home language output was also associated with home language oral proficiency. The more the child used the home language at home, the higher the oral proficiency skills were. Furthermore, home language reading frequency was associated with home language oral proficiency. The more frequently the parent and the child read a book together in the home language, the higher the child's home language oral proficiency skills were.

# Discussion

The purpose of this study was to examine the associations among parental perceptions of bilingualism for their child, home language and literacy environment, and home language oral proficiency in low-income immigrant DLL children of Mexican American and Chinese American families. The results indicated that Mexican American and Chinese American immigrant parents' beliefs, along with shared reading practices and children's language use, are related to DLL children's oral proficiency in the home language.

## Immigrant parents' perceptions of bilingualism

The Principal Components Analysis of the eight-item PoB+ data revealed two factors that represented parental perceptions toward their children's bilingualism which was the "Importance of Being Bilingual" and "English over Bilingualism." However, only the former was associated with children's home language oral proficiency. Learning English is favored due to it being a majority language in the United States (Ronderos et al., 2022), but with the next most spoken languages in the nation being Spanish and Chinese during the years 2005–2019 (US Census Bureau, 2019), being biliterate serves as an academic, social, professional, and cultural advantage.

Aligned with previous research, our findings also revealed that parents believed that bilingualism equips children to become more competitive in the job market. Both Mexican American and Chinese American families view bilingual attainment as a precursor to better career opportunities (Lao, 2004; Surrain, 2021). A possible explanation lies in the existing thought that maintaining a minority language and developing proficiency in a majority language will lead to increased economic opportunities (McCabe et al., 2013), with many Latino families believing that the Spanish and English languages are essential for success in the United States (Taylor et al., 2012). Many employers are now looking to hire bilingual or multilingual individuals, for they know that the demand for service in various languages is continuously increasing. This trend can be observed by examining demographic trends in the United States. It is projected that in the year 2030, net international migration will introduce 1.1 million people to the population, more than the nation's natural increase, and the trend will continue for the following years (Vespa et al., 2018). Given this, customers, employers, and companies will benefit from bilingual employees, hence increasing job opportunities for bilingual individuals.

Another finding showed that immigrant Mexican American and Chinese American families encouraged bilingualism so that their children could develop cultural competence. Consistent with previous research, parents associate children losing their home language with losing connections to one's cultural identity and community (Imbens-Bailey, 1996; Pease-Alvarez, 2003). When children and family are equally able to communicate in their home language, family closeness and values are maintained, whereas if communication between the parties is difficult, then conflict, perceived distance, and disagreements are more common in Asian Pacific and Latin American families (Shon and Ja, 1983; Tseng and Fuligni, 2000). For children from immigrant families, home language proficiency is essential for supporting ethnic identity and parent–child relationships (Oh and Fuligni, 2010). Overall, bilingualism for children of immigrant families is helpful for psychosocial and emotional well-being.

Furthermore, our findings revealed that parents believed bilingualism would help their children become strong thinkers. Access to two languages and cultures naturally exposes children to a wide range of experiences, perspectives, and beliefs (Poarch and Krott, 2019). These opportunities shape bilingual children's cognitive and social development and allow bilingual children to become more open-minded and develop cultural empathy from a young age (Poarch and Krott, 2019). These aspects of social cognition are important in developing friendships, communicating with peers and teachers, and understanding text. As a result, bilingual children may become strong thinkers. Moreover, since bilingual children are exposed to various perspectives and beliefs from a young age, recent research suggests bilingual preschoolers have less implicit racial bias when compared to their monolingual peers (Singh et al., 2020).

## Parental perceptions of bilingualism and home language development

The regression results of this study revealed significant associations between parental perceptions of bilingualism on the "Importance of Being Bilingual," home language and literacy environment, and home language oral proficiency. Aligned with the existing literature, the results showed that parents' positive beliefs with regard to maintaining a target language increase the use of that language and improve their children's language outcomes (De Houwer, 1999; Ronderos et al., 2022). DLLs with parents who believe that maintaining the home language and societal language, English, is essential to have higher oral proficiency in their home language. Past studies have demonstrated that most Mexican American and Chinese American parents are determined to maintain the home language when raising their DLL children (e.g., Lao, 2004; Zhang, 2010; Scott, 2011; Lee et al., 2015; Hwang et al., 2022). Immigrant parents believe that the home language represents family, childhood, heritage, and culture, while the societal language represents education, career, and opportunities (Edgerton and Karno, 1971; Lao, 2004; Zhang, 2010; Surrain, 2021). Some of these parents encourage their children to maintain the home language at home and acquire the societal language in school, as bilingualism is seen to be essential to be successful (Taylor et al., 2012).

In addition, the results demonstrated a positive association between child home language use and home language oral proficiency, which aligns with the output hypothesis (Swain, 2005). Children who use more home language with their parents achieve greater home language oral proficiency. This finding supports the previous findings with regard to language use as a learning process in language development (Hammer et al., 2009; Bohman et al., 2010; Bedore et al., 2016; Ribot et al., 2018). A possible explanation why language production is key to language growth is that the process involved in talking differs from hearing. Producing words challenges children's linguistic systems to respond and allows children to practice the mechanism of retrieval (Bohman et al., 2010; Rowe et al., 2017; Ribot et al., 2018). This allows DLLs to practice their home language and thus improve their oral proficiency.

Contrary to the existing literature in which language exposure plays a role in shaping children's language development (Hoff, 2018), parent home language input was found to be not related to DLLs' home language oral proficiency. A plausible explanation of this finding is that the quantity of language exposure alone was not enough for DLL children to develop proficiency in the home language. Although previous studies suggest that the quantity of home language exposure at home was related to DLLs' home language vocabulary outcomes (e.g., Branum-Martin et al., 2014; Cheung et al., 2019), the quality of language exposure also plays a role in children's language outcomes. Rowe and Snow (2020) state that the quality of language exposure in early childhood development matters in children's language earning trajectory. The quality of language exposure is characterized by having the opportunities to have back-and-forth communication, exposure to novel and sophisticated vocabulary, and challenges through inferential discussion. Future research should consider investigating the quality of language exposure in addition to the quantity of exposure.

Another significant finding from this study is that shared book reading in the home language has a positive effect on children's home language oral proficiency. This finding supports the previous studies that shared book reading is positively associated with English language outcomes (e.g., Hindman et al., 2012; Leech and Rowe, 2014) and home language outcomes (Cheung et al., 2019; Paradis et al., 2021; Ronderos et al., 2022). Reading to a child allows parents to teach and transfer knowledge to their children (Dexter and Stacks, 2014). Therefore, it is an excellent opportunity for DLLs to be exposed to the home language, learn vocabulary, and have discussions that otherwise would not occur in their daily lives, especially when they receive education in primarily the societal language, English.

## Limitations and future directions

The current study provides evidence that parents' beliefs and home language and literacy environment contribute to DLLs' home language oral proficiency. However, some limitations should be taken into account. First, in addition to examining the quantity of language practices, it would be desirable to investigate the quality of parent home language input and child language home output to identify the mechanisms responsible for the effects on DLLs' home language outcomes. Furthermore, future research should consider examining the mediating effects of home language and literacy practices to understand further the relationships between parent beliefs, home language and literacy environment, and child language outcomes. As demonstrated in a previous study, the association between parent beliefs and children's language outcomes may be mediated by children's choice of language use (Ribot et al., 2018). Moreover, this study only explored DLLs' expressive vocabulary and not receptive vocabulary due to time constraints. Future research should examine both expressive vocabulary and receptive vocabulary. It is also important to note that the home language oral proficiency assessment tool used in this study was only normed with Spanish-English bilingual children. Having an appropriate assessment tool for the Chinese-English bilingual children would be essential to assess these children's Chinese oral language proficiency accurately. Since the sample of the current study was from low-income households, future researchers could investigate the relationship between parent beliefs toward children's bilingualism and DLLs' home language outcomes of families with high socioeconomic status and explore potential differences between low and high socioeconomic status families.

# Conclusion

As DLL children of immigrant families in the United States acquire English, they may face challenges in maintaining their home languages and gradually lose their home language skills as they begin school (Paradis et al., 2021). Our study confirmed the vital role of parents in the minority home language development of these young DLLs. The findings suggested that immigrant parents who believe in the importance of bilingualism and employ particular home language and literacy practices, including reading to their children and allowing their children to use the home language, often lead to more positive outcomes for DLLs' home language proficiency. Parents who wish their children to maintain bilingualism successfully should engage in literacy practices in the home language to promote home language development in their children. It is also essential to encourage their children to practice producing the home language. Having a balanced usage of the home language and English would be ideal and sufficient to avoid home language retention as these children age.

## Data availability statement

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

## Ethics statement

The studies involving human participants were reviewed and approved by University of California, Berkeley IRB and University of California, Davis Reliance IRB. Written informed consent to participate in this study was provided by the participants' legal guardian/next of kin.

## Author contributions

EM, NN, XY, ML, QZ, and YU contributed to the conception and design of the study, writing and revision of the manuscript, and approval of the submitted version.

## Funding

This study was supported by the Eunice Kennedy Shriver National Institute of Child Health and Human Development of the National Institutes of Health under award number R01HD091154.

## Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

## Publisher's note



## References

Amatea, E. S. (2013). *Building Culturally Responsive Family-School Relationships*. *2nd Edn*. Boston, MA: Pearson.

Batalova, J., Hanna, M., and Levesque, C. (2021). Frequently requested statistics on immigrants and immigration in the United States. Migration Policy Institute. Available at: https://www.migrationpolicy.org/article/frequently-requested-statistics-immigrants-and-immigration-united-states-2020

Bedore, L. M., Peña, E. D., Griffin, Z. M., and Hixon, J. G. (2016). Effects of age of English exposure, current input/output, and grade on bilingual language performance. *J. Child Lang.* 43, 687–706. doi: 10.1017/S0305000915000811

Bohman, T. M., Bedore, L. M., Peña, E. D., Mendez-Perez, A., and Gillam, R. B. (2010). What you hear and what you say: language performance in Spanish-English bilinguals. *Int. J. Biling. Educ. Biling.* 13, 325–344. doi: 10.1080/13670050903342019

Branum-Martin, L., Mehta, P. D., Carlson, C. D., Francis, D. J., and Goldenberg, C. (2014). The nature of Spanish versus English language use at home. *J. Educ. Psychol.* 106, 181–199. doi: 10.1037/a0033931

Brodziak, D.R.I., Manship, K., Carbuccia-Abbott, M., Handjojo, C., Anthony, J., and Quick, H. (2021). Research brief: Approaches to supporting dual language learners in California's early learning and care programs. First Five California. Available at: https://earlyedgecalifornia.org/wp-content/uploads/2021/05/Approaches-to-Supporting-DLL-in-CAs-Early-Learning-and-Care-Programs.pdf

Bronfenbrenner, U. (2005). "The bioecological theory of human development," in *Making Human Beings Human*. ed. U. Bronfenbrenner (Thousand Oaks, CA: SAGE Publications), 3–15.

Brown, C. L. (2011). Maintaining heritage language: perspectives of Korean parents. *Multicult. Educ.* 19, 31–37.

Capps, R., Fix, M., Murray, J., Ost, J., Passel, J., and Herwantoro, S. (2005). The new demography of America's schools: Immigration and the no child left behind act. Urban Institute.

Chang, Y. F. (2008). Parents' attitudes toward the English education policy in Taiwan. *Asia Pac. Educ. Rev.* 9, 423–435. doi: 10.1007/BF03025660

Chernoff, J. J., Keuter, S., Uchikoshi, Y., Quick, H., and Manship, K. (2021). Challenges in assessing California's diverse dual language learners. American Institute for Research

Cheung, S., Kan, P. F., Winicour, E., and Yang, J. (2019). Effects of home language input on the vocabulary knowledge of sequential bilingual children. *Bilingualism* 22, 986–1004. doi: 10.1017/S1366728918000810

Chung, S., Zhou, Q., Anicama, C., Rivera, C., and Uchikoshi, Y. (2019). Language proficiency, parenting styles, and socioemotional adjustment of young dual language learners. *J. Cross-Cult. Psychol.* 50, 896–914. doi: 10.1177/0022022119867394

Curdt-Christiansen, X. L. (2009). Invisible and visible language planning: ideological factors in the family language policy of Chinese immigrant families in Quebec. *Lang. Policy* 8, 351–375. doi: 10.1007/s10993-009-9146-7

Danis, A., Bernard, J. M., and Leproux, C. (2000). Shared picture-book reading: a sequential analysis of adult-child verbal interactions. *Br. J. Dev. Psychol.* 18, 369–388. doi: 10.1348/026151000165751

De Houwer, A. (1999). "Environmental factors in early bilingual development: the role of parental beliefs and attitudes" in *Bilingualism and Migration*. eds. G. Extra and L. Verhoeven (Berlin, NY: De Gruyter Mouton), 75–96.

De Houwer, A. (2013). Harmonious bilingual development: young families' well-being in language contact situations. *Int. J. Biling.* 19, 169–184. doi: 10.1177/1367006913489202

DeTemple, J. (2001). "Parents and children reading books together" in *Beginning Literacy With Language: Young Children Learning at Home and School*. eds. D. K. Dickinson and P. O. Tabors (Baltimore, MD: Paul H. Brookes), 31–51.

Dexter, C. A., and Stacks, A. M. (2014). A preliminary investigation of the relationship between parenting, parent-child shared reading practices, and child development in low-income families. *J. Res. Child. Educ.* 28, 394–410. doi: 10.1080/02568543.2014.913278

Dixon, L. Q., Zhao, J., Quiroz, B. G., and Shin, J. Y. (2012). Home and community factors influencing bilingual children's ethnic language vocabulary development. *Int. J. Biling.* 16, 541–565. doi: 10.1177/1367006911429527

Edgerton, R. B., and Karno, M. (1971). Mexican-American bilingualism and the perception of mental illness. *Arch. Gen. Psychiatry* 24, 286–290. doi: 10.1001/archpsyc.1971.01750090092014

Ennser-Kananen, J. (2012). "Survival of the fittest": language attitudes in a German classroom. *Int. J. Lang. Stud.* 6, 39–66.

Espinosa, L. M. (2013). *Early Education for Dual Language Learners: Promoting School Readiness and Early School Success*. Washington, DC: Migration Policy Institute.

Farruggio, P. (2005). Latino parents' attitudes toward bilingual education (publication no. AAI3165358). Doctoral dissertation. University of California, Berkeley. ProQuest dissertations and these Gobal.

Gámez, P. B., González, D., and Urbin, L. N. M. (2017). Shared book reading and English learners' narrative production and comprehension. *Read. Res. Q.* 52, 275–290. doi: 10.1002/rrq.174

García, O., Zakharia, Z., and Otcu, B. (2012). *Bilingual Community Education and Multilingualism*. Bristol, UK: Multilingual Matters.

García, A. M., Zhang, R., King, A., and Morita-Mullaney, T. (2022). Español, el idioma que nosotros hablamos: a collective case study of home language use and literacy practices of Mexican American families. *Sch. Community J.* 31, 213–238.

Goodrich, J. M., Lonigan, C. J., Phillips, B. M., Farver, J. A. M., and Wilson, K. D. (2021). Influences of the home language and literacy environment on Spanish and English vocabulary growth among dual language learners. *Early Child. Res. Q.* 57, 27–39. doi: 10.1016/j.ecresq.2021.05.002

Guardado, M. (2002). Loss and maintenance of first language skills: case studies of hispanic families in Vancouver. *Can. Mod. Lang. Rev.* 58, 341–363. doi: 10.3138/cmlr.58.3.341

Haft, S. L., Gys, C. L., Bunge, S., Uchikoshi, Y., and Zhou, Q. (2021). Home language environment and executive functions in Mexican American and Chinese American preschoolers in head start. *Early Educ. Dev.* 33, 608–633. doi: 10.1080/10409289.2021.1912548

Hammer, C. S., Davison, M. D., Lawrence, F. R., and Miccio, A. W. (2009). The effect of maternal language on bilingual children's vocabulary and emergent literacy development during head start and kindergarten. *Sci. Stud. Read.* 13, 99–121. doi: 10.1080/10888430902769541

Hammer, C. S., Miccio, A. W., and Wagstaff, D. A. (2003). Home literacy experiences and their relationship to bilingual preschoolers' developing English literacy abilities: an initial investigation. *Lang. Speech Hear. Serv. Sch.* 34, 20–30. doi: 10.1044/0161-1461(2003/003)

Hindman, A. H., Wasik, B. A., and Erhart, A. C. (2012). Shared book reading and head start preschoolers' vocabulary learning: the role of book-related discussion and curricular connections. *Early Educ. Dev.* 23, 451–474. doi: 10.1080/10409289.2010.537250

Hoff, E. (2018). Bilingual development in children of immigrant families. *Child Dev. Perspect.* 12, 80–86. doi: 10.1111/cdep.12262

Hwang, J. K., Mancilla-Martinez, J., Flores, I., and McClain, J. B. (2022). The relationship among home language use, parental beliefs, and Spanish-speaking children's vocabulary. *Int. J. Biling. Educ. Biling.* 25, 1175–1193. doi: 10.1080/13670050.2020.1747389

IBM Corp (2020). IBM SPSS statistics for Macintosh (version 28.0) [computer software]. IBM Corp. Available at: https://www.ibm.com/spss

Imbens-Bailey, A. L. (1996). Ancestral language acquisition. *J. Lang. Soc. Psychol.* 15, 422–443. doi: 10.1177/0261927x960154002

King, K. A., Fogle, L., and Logan-Terry, A. (2008). Family language policy. *Lang. Linguist. Compass* 2, 907–922. doi: 10.1111/j.1749-818X.2008.00076.x

Krashen, S. D. (1985). *The Input Hypothesis: Issues and Implications*. London, UK: Longman.

Lao, C. (2004). Parents' attitudes toward Chinese–English bilingual education and Chinese-language use. *Biling. Res. J.* 28, 99–121. doi: 10.1080/15235882.2004.10162614

Lau, C., and Richards, B. (2021). Home literacy environment and children's English language and literacy skills in Hong Kong. *Front. Psychol.* 11:569581. doi: 10.3389/fpsyg.2020.569581

Lee, J. S. (2002). The Korean language in America: the role of cultural identity in heritage language learning. *Lang. Cult. Curric.* 15, 117–133. doi: 10.1080/07908310208666638

Lee, M., Shetgiri, R., Barina, A., Tillitski, J., and Flores, G. (2015). Raising bilingual children: a qualitative study of parental attitudes, beliefs, and intended behaviors. *Hisp. J. Behav. Sci.* 37, 503–521. doi: 10.1177/0739986315602669

Leech, K. A., and Rowe, M. L. (2014). A comparison of preschool children's discussions with parents during picture book and chapter book reading. *First Lang.* 34, 205–226. doi: 10.1177/0142723714534220

Lever, R., and Sénéchal, M. (2011). Discussing stories: on how a dialogic reading intervention improves kindergartners' oral narrative construction. *J. Exp. Child Psychol.* 108, 1–24. doi: 10.1016/j.jecp.2010.07.002

Lewis, K., Sandilos, L. E., Hammer, C. S., Sawyer, B. E., and Méndez, L. I. (2016). Relations among the home language and literacy environment and children's language abilities: a study of head start dual language learners and their mothers. *Early Educ. Dev.* 27, 478–494. doi: 10.1080/10409289.2016.1082820

Leyendecker, B., Cabrera, N., Lembcke, H., Willard, J., Kohl, K., and Spiegler, O. (2018). Parenting in a new land. *Eur. Psychol.* 23, 57–71. doi: 10.1027/1016-9040/a000316

Liang, F. (2018). Parental perceptions toward and practices of heritage language maintenance: focusing on the United States and Canada. *Int. J. Lang. Stud.* 12, 65–86.

Luk, G., and Surrain, S. (2019). The Perceptions of Bilingualism Scales. PsyArXiv [Preprint]. doi: 10.31234/osf.io/s32zb

Luo, R., Pace, A., Levine, D., Iglesias, A., de Villiers, J., Golinkoff, R. M., et al. (2021). Home literacy environment and existing knowledge mediate the link between socioeconomic status and language learning skills in dual language learners. *Early Child. Res. Q.* 55, 1–14. doi: 10.1016/j.ecresq.2020.10.007

Lutz, A. (2008). Negotiating home language: Spanish maintenance and loss in Latino families negotiating home language. *Lat. Am. Res. Rev.* 6, 37–64.

Malin, J. L., Cabrera, N. J., and Rowe, M. L. (2014). Low-income minority mothers' and fathers' reading and children's interest: longitudinal contributions to children's receptive vocabulary skills. *Early Child. Res. Q.* 29, 425–432. doi: 10.1016/j.ecresq.2014.04.010

McCabe, A., Tamis-LeMonda, C. S., Bornstein, M. H., Brockmeyer Cates, C., Golinkoff, R., Wishard Guerra, A., et al. (2013). Multilingual children beyond myths and towards best practices. *Soc. Policy Rep.* 27, 1–37. doi: 10.1002/j.2379-3988.2013.tb00077.x

Melo-Pfeifer, S. (2015). The role of the family in heritage language use and learning: impact on heritage language policies. *Int. J. Biling. Educ. Biling.* 18, 26–44. doi: 10.1080/13670050.2013.868400

Mitchell, C. (2020). U.S. schools see surge in number of Arabic-and Chinese-speaking English-learners. Education Week. Available at: https://www.edweek.org/teaching-learning/u-s-schools-see-surge-in-number-of-arabic-and-chinese-speaking-english-learners/2020/01

Mori, Y., and Calder, T. M. (2017). The role of parental support and family variables in L1 and L2 vocabulary development of Japanese heritage language students in the United States. *Foreign Lang. Ann.* 50, 754–775. doi: 10.1111/flan.12304

Mu, G. M. (2015). A meta-analysis of the correlation between heritage language and ethnic identity. *J. Multiling. Multicult. Dev.* 36, 239–254. doi: 10.1080/01434632.2014.909446

National Clearinghouse for English Language Acquisition (2019). Dual language learners and state-funded preschool fact sheet. Available at: https://ncela.ed.gov/files/fast_facts/19-0181-DualLanguage-StatePreschool-20191024-508.pdf

National Clearinghouse for English Language Acquisition (2022). English learners: Demographic trends. Available at: https://ncela.ed.gov/files/fast_facts/ELDemographics_20220805_508.pdf

Nesteruk, O. (2010). Heritage language maintenance and loss among the children of eastern European immigrants in the USA. *J. Multiling. Multicult. Dev.* 31, 271–286. doi: 10.1080/01434630903582722

Oh, J. S., and Fuligni, A. J. (2010). The role of heritage language development in the ethnic identity and family relationships of adolescents from immigrant backgrounds. *Soc. Dev.* 19, 202–220. doi: 10.1111/j.1467-9507.2008.00530.x

Oladejo, J. (2006). Parents' attitudes towards bilingual education policy in Taiwan. *Biling. Res. J.* 30, 147–170. doi: 10.1080/15235882.2006.10162870

Paradis, J., Genesee, F., and Crago, M. B. (2021). *Dual Language Development and Disorders: A Handbook on Bilingualism and Second Language Learning. 3rd Edn.* Baltimore, MD: Brookes Publishing Company.

Park, S. M. (2013). Immigrant students' heritage language and cultural identity maintenance in multilingual and multicultural societies. Concordia working papers. *Appl. Linguis.* 4, 30–53.

Pease-Alvarez, L. (2003). "Transforming perspectives on bilingual language socialization," in *Language Socialization in Bilingual and Multilingual Societies*. eds. R. Bayley and S. R. Schecter (Bristol, UK: Multilingual Matters), 9–24.

Peña, E. D., Gutierrez-Clellen, V. F., Iglesias, A., Goldstein, B. A., and Bedore, L. M. (2014). *Bilingual English Spanish Assessment (BESA)*. San Rafael, CA: AR Clinical Publications.

Poarch, G. J., and Krott, A. (2019). A bilingual advantage? An appeal for a change in perspective and recommendations for future research. *Behav. Sci.* 9, 1–13. doi: 10.3390/bs9090095

Portes, A., and MacLeod, D. (1996). Educational progress of children of immigrants: the roles of class, ethnicity, and school context. *Sociol. Educ.* 69, 255–275. doi: 10.2307/2112714

Portes, A., and Rumbaut, R. G. (2014). *Immigrant America: A Portrait*. 4th edn. Oakland, CA: University of California Press.

Qin, D. B. (2006). Our child doesn't talk to us anymore: alienation. *Anthropol. Educ. Q.* 37, 162–179. doi: 10.1525/aeq.2006.37.2.162

Ribot, K. M., Hoff, E., and Burridge, A. (2018). Language use contributes to expressive language growth: evidence from bilingual children. *Child Dev.* 89, 929–940. doi: 10.1111/cdev.12770

Ronderos, J., Castilla-Earls, A., and Marissa Ramos, G. (2022). Parental beliefs, language practices and language outcomes in Spanish-English bilingual children. *Int. J. Biling. Educ. Biling.* 25, 2586–2607. doi: 10.1080/13670050.2021.1935439

Rosas, G. (2015). Acquiring English as a second language for Mexican American students. [Capstone Projects, California State University, Monterey Bay]. Capstone projects and Master's theses. Available at: https://digitalcommons.csumb.edu/caps_thes/523

Rowe, M. L., Leech, K. A., and Cabrera, N. (2017). Going beyond input quantity: why questions matter for toddlers' language and cognitive development. *Cogn. Sci.* 41, 162–179. doi: 10.1111/cogs.12349

Rowe, M. L., and Snow, C. E. (2020). Analyzing input quality along three dimensions: interactive, linguistic, and conceptual. *J. Child Lang.* 47, 5–21. doi: 10.1017/S0305000919000655

RStudio Team (2021). RStudio: Integrated development environment for R. [computer software] RStudio, PBC. Available at: http://www.rstudio.com/

Schrank, F. A., Mather, N., and McGrew, K. S. (2014). *Woodcock-Johnson IV Tests of Oral Language*. Rolling Meadows, IL: Riverside.

Schwartz, S. J., Unger, J. B., Zamboanga, B. L., and Szapocznik, J. (2010). Rethinking the concept of acculturation: implications for theory and research. *Am. Psychol.* 65, 237–251. doi: 10.1037/a0019330

Scott, L. (2011). Parental language learning beliefs and practices in young children's second language acquisition and bilingual development: Case studies of Mexican heritage families in California and Arizona. Doctoral dissertation. University of California, Berkeley. ProQuest dissertations and theses global.

Sénéchal, M., Lefevre, J.-A., Thomas, E. M., and Daley, K. E. (1998). Differential effects of home literacy experiences on the development of oral and written language. *Read. Res. Q.* 33, 96–116. doi: 10.1598/rrq.33.1.5

Sénéchal, M., Pagan, S., Lever, R., and Ouellette, G. P. (2008). Relations among the frequency of shared reading and 4-year-old children's vocabulary, morphological and

syntax comprehension, and narrative skills. *Early Educ. Dev.* 19, 27–44. doi: 10.1080/10409280701838710

Shon, S. P., and Ja, D. Y. (1983). "Asian families," in *Ethnicity and Family Therapy*. eds. M. McGoldrick, J. K. Pearce and J. Giodano (New York, NY: Guilford Press), 208–228.

Singh, L., Quinn, P. C., Qian, M., and Lee, K. (2020). Bilingualism is associated with less racial bias in preschool children. *Dev. Psychol.* 56, 888–896. doi: 10.1037/dev0000905

Sun, H. (2019). Home environment, bilingual preschooler's receptive mother tongue language outcomes, and social-emotional and behavioral skills: one stone for two birds? *Front. Psychol.* 10:1640. doi: 10.3389/fpsyg.2019.01640

Sun, H., Low, J., and Chua, I. (2022a). Maternal heritage language proficiency and child bilingual heritage language learning. *Int. J. Biling. Educ. Biling.*, 1–15. doi: 10.1080/13670050.2022.2130153

Sun, H., Ng, S. C., O'Brien, B. A., and Fritzsche, T. (2020). Child, family, and school factors in bilingual preschoolers' vocabulary development in heritage languages. *J. Child Lang.* 47, 817–843. doi: 10.1017/S0305000919000904

Sun, H., Waschl, N., Veera, R., and Sun, H. (2022b). Language experience and bilingual children's heritage language learning. *Stud. Second. Lang. Acquis.* 44, 1356–1383. doi: 10.1017/S0272263121000942

Surrain, S. (2021). 'Spanish at home, English at school': how perceptions of bilingualism shape family language policies among Spanish-speaking parents of preschoolers. *Int. J. Biling. Educ. Biling.* 24, 1163–1177. doi: 10.1080/13670050.2018.1546666

Swain, M. (2005). "The output hypothesis: theory and research," in *Handbook of Research in Second Language Teaching and Learning*. ed. E. Hinkel (Oxfordshire, UK: Erlbaum), 471–483.

Taylor, D. (1983). *Family Literacy: Young Children Learning to Read and Write*. Portsmouth, NH: Heinemann Educational Books.

Taylor, P., Lopez, M. H., Martinez, J., and Velasco, G. (2012). When labels don't fit: Hispanics and their views of identity. Pew Research Center. Available at: http://www.pewhispanic.org/2012/04/04/when-labels-dont-fit-hispanics-and-their-views-of-identity/

Tseng, V., and Fuligni, A. J. (2000). Parent-adolescent language use and relationships among immigrant families with east Asian, Filipino, and Latin American backgrounds. *J. Marriage Fam.* 62, 465–476. doi: 10.1111/j.1741-3737.2000.00465.x

Tunmer, W. E., and Hoover, W. (1992). "Cognitive and linguistic factors in learning to read," in *Reading Acquisition*. eds. P. B. Gough, L. C. Ehri and R. Treiman (Hillsdale, NJ: Erlbaum), 175–224.

Uchikoshi, Y. (2013). Predictors of English reading comprehension: Cantonese-speaking English language learners in the U.S. *Read. Writ.* 26, 913–939. doi: 10.1007/s11145-012-9398-z

Uchikoshi, Y., Lindblad, M., Plascencia, C., Tran, H., Yu, H., Bautista, K. J., et al. (2022). Parental acculturation and children's bilingual abilities: a study with Chinese American and Mexican American preschool DLLs. *Front. Psychol.* 12:761043. doi: 10.3389/fpsyg.2021.761043

US Census Bureau (2019). Language spoken at home. Available at: https://data.census.gov/cedsci/table?q=s1601&tid=ACSST5Y2019.S1601

Valdéz, G. (2001). "Heritage language students: profiles and possibilities," in *Heritage Language in America: Preserving a National Resource*. eds. J. K. Peyton, D. A. Ranard and S. McGinnis (Washington, DC: Center of Applied Linguistics), 37–77.

Veenhoven, R. (2008). "Sociological theories of subjective well-being" in *The Science of Subjective Well-Being: A Tribute to Ed Diener*. eds. M. Eid and R. Larsen (New York, NY: Guilford Publications), 44–61.

Vespa, J., Medina, L., and Armstrong, M.D. (2018). Demographic turning points for the United States. Available at: https://www.census.gov/content/dam/Census/library/publications/2020/demo/p25-1144.pdf

Wasik, B. A., and Bond, M. A. (2001). Beyond the pages of a book: interactive book reading and language development in preschool classrooms. *J. Educ. Psychol.* 93, 243–250. doi: 10.1037/0022-0663.93.2.243

Wasik, B. A., Hindman, A. H., and Snell, E. K. (2016). Book reading and vocabulary development: a systematic review. *Early Child. Res. Q.* 37, 39–57. doi: 10.1016/j.ecresq.2016.04.003

Wei, R. (2011). Parental support for Chinese–English bilingual education: a survey of parents of primary and secondary students in Shanghai. *J. Multiling. Multicult. Dev.* 32, 481–496. doi: 10.1080/01434632.2011.592588

Wendling, B. J., Mather, N., and Schrank, F. A. (2019). *Examiner's Manual*. Bateria IV Woodcock-Muñoz: Pruebas de habilidades cognitivas. Itasca, IL: Riverside Assessments, LLC.

Williams, A. I., Uchikoshi, Y., Bunge, S., and Zhou, Q. (2019). Relations of English and heritage language proficiency to response inhibition and attention shifting in dual language learners in head start. *Early Educ. Dev.* 30, 357–374. doi: 10.1080/10409289.2018.1544812

Wong Fillmore, L. (2000). Loss of family languages: should educators be concerned? *Theory Pract.* 39, 203–210. doi: 10.1207/s15430421tip3904_3

Zhang, D. (2004). Home language maintenance among second generation Chinese American children. *Work. Papers Educ. Linguist.* 19, 33–53.

Zhang, D. (2010). Language maintenance and language shift among Chinese immigrant parents and their second-generation children in the U.S. *Biling. Res. J.* 33, 42–60. doi: 10.1080/15235881003733258

Zhang, D., and Slaughter-Defoe, D. T. (2009). Language attitudes and heritage language maintenance among Chinese immigrant families in the USA. *Lang. Cult. Curric.* 22, 77–93. doi: 10.1080/07908310902935940

frontiers | Frontiers in Psychology

TYPE Original Research
PUBLISHED 09 February 2023
DOI 10.3389/fpsyg.2023.1101995



OPEN ACCESS

EDITED BY
Vicky Chondrogianni,
The University of Edinburgh, United Kingdom

REVIEWED BY
Bernhard Brehmer,
University of Konstanz, Germany
Elena Babatsouli,
University of Louisiana at Lafayette,
United States

*CORRESPONDENCE
Yulia Rodina
✉ yulia.rodina@uit.no

SPECIALTY SECTION
This article was submitted to Language Sciences, a section of the journal Frontiers in Psychology

RECEIVED 18 November 2022
ACCEPTED 23 January 2023
PUBLISHED 09 February 2023

CITATION
Rodina Y, Bogoyavlenskaya A, Mitrofanova N and Westergaard M (2023) Russian heritage language development in narrative contexts: Evidence from pre- and primary-school children in Norway, Germany, and the UK. *Front. Psychol.* 14:1101995. doi: 10.3389/fpsyg.2023.1101995



# Russian heritage language development in narrative contexts: Evidence from pre- and primary-school children in Norway, Germany, and the UK

Yulia Rodina[1]*, Alexandra Bogoyavlenskaya[1], Natalia Mitrofanova[1] and Marit Westergaard[1,2]

[1]Department of Language and Culture, UiT The Arctic University of Norway, Tromsø, Norway, [2]Department of Language and Literature, NTNU Norwegian University of Science and Technology, Trondheim, Norway

The present study aims at obtaining a comprehensive picture of language development in Russian heritage language (RHL) by bringing together evidence from previous investigations focusing on morphosyntax and global accent as well as from a newly conducted analysis of a less-studied domain–lexical development. Our investigation is based on a narrative sample of 143 pre- and primary-school bilinguals acquiring RHL in Norway, Germany, and the United Kingdom. We performed a multiple-way analysis of lexical production in RHL across the different national contexts, across both languages (heritage and societal), also comparing bilinguals and monolinguals. The results revealed a clear and steady increase with age in narrative length and lexical diversity for all bilingual groups in both of their languages. The variation in lexical productivity as well as the differences between the bilingual groups and between bilinguals and monolinguals were attributed to input factors with language exposure in the home and age of starting preschool as the major predictors. We conclude that, overall, the results from lexical, grammatical, and phonological acquisition in RHL support the view that having longer exclusive or uninterrupted exposure to a heritage language in early childhood is beneficial for its development across domains.

KEYWORDS

**lexical development, Russian heritage language, oral narratives, individual factors, Germany, Norway, the UK**

## 1. Introduction

Russian heritage language (RHL) has a prominent place in the empirical landscape of heritage language research. In the past two decades, a large number of studies have appeared around the world reporting data from child and adult heritage speakers of Russian with different societal majority languages (English, German, Hebrew, Norwegian, Finnish, Swedish, Latvian, Spanish, and Dutch among others). Thus, to date there is considerable knowledge about the linguistic behavior and competence in RHL at early and later stages of language development (Dieser, 2009; Polinsky, and Maria., 2008; Laleko, 2010, 2022; Schwartz et al., 2015; Brehmer and Kurbangulova, 2017; Rodina, 2017; Gagarina et al., 2021; Krüger, 2021; Meir and Janssen, 2021; Otwinowska et al., 2021; among others). The available observations come primarily from specific case studies. Large-scale investigations studying RHL development across a wider age range and

a larger number of children are scarce. To fill in this gap, in the current study, we investigate heritage language development in pre- and primary-school children between the ages of 3 and 10 based on data obtained in a large-scale project focusing on the grammatical and phonological (global accent) development in RHL in Norway, Germany, and the United Kingdom (UK) (Mitrofanova et al., 2018, 2022; Rodina et al., 2020; Kupisch et al., 2021).[1]

The in-depth investigation of grammatical gender in these studies revealed that bilinguals in different national contexts developed fine-grained sensitivity to grammatical gender cues in Russian, which ensured their successful acquisition of this property. It was also evident that pre- and primary-school bilinguals as well as Russian monolinguals apply the same mechanisms and display the same developmental patterns in the acquisition of gender. Furthermore, in a subset of the data collected in Germany, we observed a shift from sounding more accented in the majority language during preschool to sounding more accented in RHL in primary school years (due to a change in exposure patterns characterized by a steady increase in the exposure and use of the majority language). Both the acquisition of gender and global accent patterns in RHL were found to be affected by several background variables, including family type, age of starting preschool, and exposure to RHL instruction as the most important ones.

To obtain a comprehensive picture of language development in RHL, in the present study, we focus on a less-studied domain–lexical development. We perform a multiple-way comparison of oral language samples of 143 German-Russian, Norwegian-Russian, and English-Russian bilinguals aged 3–10 as well as 31 Russian-speaking monolingual peers. Lexical production patterns are assessed in both of the bilinguals' languages with an ecological language procedure, narrative storytelling, which, in contrast to vocabulary tests, taps into the ability to use vocabulary in real-life situations. The oral language samples in the present study were obtained using narrative elicitation material in the Multilingual Assessment Instrument for Narratives (MAIN) (Gagarina et al., 2012). To investigate vocabulary growth, we employ two widely used measures: total number of words (TNW) and the number of different words (NDW). We also explore the relationship between lexical productivity measures and the individual background factors which were found to be important predictors of development across different linguistic domains (Lloyd-Smith et al., 2020).

## 2. Previous research on lexical development in RHL

Much of the existing evidence identifies lexicon as a domain of major deficits in heritage language speakers across different languages including Russian (for an overview, see Unsworth, 2013; Scontras et al., 2015). Specifically, due to the distributed and context-specific nature of bilingual language learning, bilingual children are typically found to score below age-appropriate norms for monolingual children on tasks of receptive vocabulary, such as the Peabody Picture Vocabulary Test (PPVT) (Pearson et al., 1993, 1997; Dunn and Dunn, 2007). Differences in vocabulary development and lexical retrieval between heritage and monolingual children are reported in various other studies (e.g., Yan and Nicoladis, 2009; Silvén et al., 2014; Jia and Paradis, 2015). Importantly, a comparison of lexical development in younger and older bilingual children typically reveals a rapid age-related growth of vocabulary in the majority language, but a stabilization or stagnation of vocabulary development in the heritage language as a function of the shift in exposure, causing a shift in language dominance (Gathercole and Thomas, 2009; Bialystok et al., 2010; Sheng et al., 2011). This shift is known to be unique to Heritage Speakers' (HS) acquisition trajectory and usually occurs when the child starts formal education (Montrul, 2016). The onset of schooling (taking place as early as age 5 in some countries) is characterized by an increase in input and use of the societal majority language and a corresponding decrease in input and use of the HL characteristic of the home environment. The acquisition of literacy in the majority language further contributes to this shift in the linguistic environment of HSs. Such a shift is shown to affect all linguistic domains, including vocabulary. As discussed below, this shift shapes bilinguals' lexical development in RHL and will be important for the discussion of the results of the current study in the (Section "5. Discussion").

Previous research on RHL addressed certain aspects of vocabulary acquisition based on narrative, experimental, and longitudinal data (Bar-Shalom and Zaretsky, 2008; Gagarina et al., 2014; Klassert et al., 2014; Ringblom and Dobrova, 2019; Makarova and Terekhova, 2020; Montanari et al., 2020; Czapka et al., 2021). Several of the studies have been conducted in Germany, where Russian is one of the most frequently spoken and intensively investigated HLs. For example, Klassert et al. (2014) investigated a rarely addressed question of whether nouns are more vulnerable in bilingual acquisition than verbs. Their comparison of naming abilities for nouns and verbs in three age groups of German-Russian bilinguals (4;0–4;11, 5;0–5;11, and 6;0–6;11) and four age groups of Russian and German monolinguals (3;6–3;11, 4;0–4;11, 5;0–5;11, and 6;0–6;11) revealed a more pronounced naming deficit for nouns than for verbs, since bilinguals performed consistently below the younger monolingual children in noun naming. The higher vulnerability of nouns has been attributed to the reduced input for bilingual children as well as to the different distributions of nouns and verbs in the input. Of relevance to the present study is another central observation of Klassert et al. (2014): While verb naming developed at a similar rate in Russian and German, there was a stronger growth in noun naming in German than in Russian in 5- and 6-year-olds. This is explained by a combination of language internal and language external factors, such as the availability and saliency of nouns and verbs in the input of bilingual children and most importantly the shift in language dominance toward German at around age 5.

More recently, Montanari et al. (2020) and Czapka et al. (2021) investigated the developmental trajectories of pre- and primary-school German-Russian bilinguals. Both are comparative studies of lexical development in Russian and Turkish HLs, showing that the migrant community characteristics mediate HL acquisition in important ways. In the longitudinal sample of Russian 2–4-year-olds ($n$ = 70), Czapka et al. (2021) observe a significant growth of expressive vocabulary over the course of four testing times. The children's societal language, German, was not tested, but importantly, a later age of onset of German as well as more HL input from siblings were found to be significant predictors of vocabulary size in RHL. In contrast, the expressive vocabulary of German-Russian bilinguals ($n$ = 113, age range 6–10) in Montanari et al. (2020) failed to progress

1 In Rodina et al. (2020), we also report on data from Hebrew-Russian and Latvian-Russian bilinguals. These data are not included in the present study, since lexical measures were not obtained from those groups.

in the timespan of four primary school years, which was interpreted as a sign of attrition. Yet, a picture-naming task revealed that the expressive as well as the receptive vocabularies were already well-developed in the youngest children in this study. A considerably large vocabulary size in RHL was found to correlate with several characteristics of the Russian-speaking community, such as the mothers' proficiency in the HL, parental level of education (university degree), place where the highest level of education was obtained (the country of origin) as well as HL support from associations or school classes. At the same time, there was no shift toward German detected in this bilingual group whose lexicon was found to be rather balanced in the two languages.

Several other studies have investigated a different set of lexical parameters in RHL spoken in Canada, Sweden, and the United States. Makarova and Terekhova (2020) analyzed narrative samples of 29 Russian-speaking bilinguals (age 5–6) from Canada and 13 monolinguals from Russia. In addition to the traditional measures of vocabulary development that are also central in the present study (TNW and NDW), the authors provide a qualitative analysis of the bilinguals' vocabulary and their non-canonical lexical forms. The bilingual-monolingual comparison in this study revealed no differences in narrative length in words, different lexemes, words per utterance or speech rate (in number of words per minute). However, RHL speaking children produced significantly more non-canonical lexical forms (e.g., *dyrka* "hole" instead of *nora* "burrow") as compared to their monolingual peers. Qualitatively, the vocabulary of RHL speaking children and Russian monolinguals had some similar features, such as occasionalisms (i.e., the use of words and word forms invented by children), substitutions of more specific words for more generic ones, and the use of colloquial/vernacular forms. At the same time, some specific features associated with the development of heritage language in immigrant minority settings were also identified, such as the use of dialectal sound constituents of words and code-switches to English. Numerous lexical errors were also observed in Swedish-Russian ($n$ = 20, age 6–8) (Ringblom and Dobrova, 2019) and English-Russian ($n$ = 15, 4;0–10;11, mean age = 8;3) bilinguals (Bar-Shalom and Zaretsky, 2008). A qualitative analysis of the errors attested in Ringblom and Dobrova (2019) showed that they were largely similar to the errors produced by Russian monolinguals, but they persisted at much later ages in bilinguals (age 6 and later vs. age 3 in monolinguals). In the production of the bilinguals, the lexical errors were largely direct translations from English (Bar-Shalom and Zaretsky, 2008). Accompanied by numerous morphosyntactic errors, these non-target-consistent forms were in stark contrast to the low number of aspectual errors, suggesting that grammatical aspect may be spared from restructuring in RHL and that the lexicon is more vulnerable. This is particularly noticeable during the years in which HSs' input and dominance are undergoing a major shift in favor of the majority language.

The studies reviewed in this section and especially the studies on RHL spoken in Germany reveal some general tendencies of lexical development in child bilingualism, such as age-appropriate vocabulary growth during preschool years followed by a likely stagnation in primary school as well as a possibility of a shift toward the societal majority language around the age of 5. These tendencies are addressed in the present investigation, although a direct comparison with the reviewed studies is not possible due to the differences in the research methodologies.

# 3. The present study

## 3.1. Research questions

To obtain a more detailed and comprehensive picture of HSs' lexical development, we investigate lexical production patterns in a large dataset from pre- and primary-school children acquiring RHL in three national contexts–Germany, Norway, and the UK. The diversity of the socio-cultural contexts and the wide age range of our participants should allow us to capture the effects for lexical development associated with the shift in input and dominance of bilinguals. While the main objective of the present study is to investigate lexical development in the HL, additional insights are obtained from a comparison of bilinguals with age-matched Russian monolinguals as well as from a comparison of lexical production in both of the bilinguals' languages.

We ask the following research questions:

> RQ1: How does lexical development proceed in RHL of pre- and primary-school children?
>
> RQ2: How does the shift in language input and use during school-age affect lexical development in RHL, if at all? More specifically, are there signs of stabilization or stagnation of vocabulary development?
>
> RQ3: Which individual background factors can explain the variance in lexical knowledge in the oral narratives of RHL speaking children?

In our previous studies, we have identified several background factors characteristic of RHL bilingualism in Germany, Norway, and the UK, including the child's age, age of onset of acquisition of the majority language, family type (Russian only or mixed), presence of an older sibling, age of preschool start, size of the HR community, current exposure to HR instruction, and main language of instruction (Mitrofanova et al., 2018; Rodina et al., 2020). Several of these factors have been found to be significant predictors of the bilinguals' performance in a series of gender assignment tasks, such as language exposure in the home defined in terms of family type (HR family vs. mixed family), the size of the HR community, and current exposure to HR instruction. Furthermore, we have identified that the probability of developing a reduced gender system was predicted in particular by family type, age of preschool start, and current exposure to HR instruction. Overall, addressing the effects of a wide range of factors in the current study will contribute to creating a more precise profile of RHL within and across different national contexts. More specifically, we hypothesize that several of the individual background factors may predetermine the (time of) the dominance shift. Previous research suggests that the shift in language dominance toward the societal language takes place at around age 5. Furthermore, there may be several shifts taking place at different times/ages in different national contexts. As presented in the next section, for Russian-speaking children in Germany and the UK, the onset of regular exposure to the majority language is considerably later than for Russian-speaking children in Norway: children in Norway typically start preschool already at age one, while in Germany and the UK they normally do not start daycare or preschool until the age of 3. Hence, the length of

TABLE 1 Background information on the participants per group and family type.

| Group | Total *N* | Mixed family | Minority family | Preschool | Primary school | Age range (mean) |
|---|---|---|---|---|---|---|
| German-Russian | 67 | 19 | 48 | 39 | 28 | 3–11 (6.7) |
| Norwegian-Russian | 26 | 13 | 13 | 9 | 17 | 4–10 (6.7) |
| English-Russian | 19 | 10 | 9 | 1 | 18 | 4–10 (7.2) |
| Russian monolinguals | 31 | – | – | 16 | 15 | 4–10 (6.4) |

uninterrupted exposure to Russian is shorter for Russian-speaking children in Norway, who also on average receive fewer hours of Russian instruction. Thus, the patterns of lexical development in RHL in Norway, Germany, and the UK may be different, reflecting the input and language dominance patterns in a specific national context.

## 3.2. Participants

The participants in the present study are 143 typically developing pre- and primary-school-aged children (mean age = 6.5), divided into four groups: English-Russian, Norwegian-Russian, German-Russian bilinguals, acquiring Russian as a HL, and Russian monolinguals. All the children attended public preschools, starting at age 1 in Norway, and ages 3–4 in Germany and England. All the bilinguals were attending heritage language classes, with different number of hours of instruction in Russian (varying between two and eight h per week). An overview of the participant groups is presented in **Table 1**.

The Norwegian group in this study consisted of 26 typically developing Norwegian-Russian children aged 4–10 (mean age = 6.7) from Tromsø ($n$ = 2), Oslo ($n$ = 13) and Asker ($n$ = 11). Half of the children ($n$ = 13, mean age = 6.3) were from mixed Norwegian-Russian households (i.e., families with one Russian- and one Norwegian-speaking parent), the other half from Russian-speaking families ($n$ = 13, mean age = 7.1). Nine children attended preschool, and 17 went to public schools with instruction in Norwegian. All the children produced narratives in both Russian and Norwegian.

Sixty-seven German-Russian bilingual children (mean age = 6.7) were recruited in Berlin ($n$ = 17), Singen ($n$ = 39), and Stuttgart ($n$ = 7). Of these, 19 children were from families with one Russian- and one German-speaking parent (mean age = 6.5), while 47 children (mean age = 6.1) were from families with two Russian-speaking parents. Thirty-nine children attended preschool, and 28 went to German primary schools. From these children, we elicited sixty-seven narratives in the HL and fifty-three in the societal language.

In England, 19 English-Russian bilinguals (mean age = 7.2) participated in the study. The narratives were collected in London ($n$ = 10) and Reading ($n$ = 9). Ten of the children (mean age = 7.2) were raised in families with one Russian- and one English-speaking parent, and nine children (mean age = 7.2) were from families with two Russian-speaking parents. Eighteen out of 19 participants were primary school children in the UK (note that children typically start school after their fourth birthday). The children produced 19 narratives in the HL and 12 narratives in the societal language.

In addition, the narratives of the Russian-speaking monolinguals ($n$ = 31, mean age = 6.4) were collected in Ivanovo, Central Russia: 16 children went to preschool and 15 attended primary school.

## 3.3. Methodology

The languages samples were obtained using the Multilingual Assessment Instrument for Narratives (MAIN, Gagarina et al., 2012). MAIN was designed to assess narrative skills (comprehension and production) in multilingual preschool and school-aged children up to the age of ten. The task contains four stories, each with a six-picture sequence: "Dog," "Cat," "Baby Goats," and "Baby Birds." The stories have parallel plots (in terms of characters, objects, events, foreground and background information) and are controlled for cognitive and linguistic complexity as well as cultural appropriateness.

Two MAIN stories were used to elicit oral narratives – "Baby Goats" and "Baby Birds." The bilingual participants were divided into two groups, one was presented with "Baby Goats" in Russian and "Baby Birds" in the majority language, while the other did the opposite, "Baby Birds" in Russian and "Baby Goats" in the majority language. Half of the monolingual participants were presented with "Baby Birds," while the other half were presented with "Baby Goats." The picture material was printed out and presented according to the MAIN guidelines. The bilingual children were tested on two different days: one session per language with approximately one week in between. Prior to the narrative elicitation, there was a warm-up session when participants listened to a pre-recorded "Dog" or "Cat" story and answered some comprehension questions afterward. This was done in order to create a natural atmosphere and provide an example of storytelling. During the narrative production, the children were asked to choose a story in one of three envelopes and narrate it for the interlocutor without showing the pictures.

The storytelling was recorded and transcribed orthographically, and the transcripts were checked by two experienced researchers. Non-words, mazes, hesitations, repetitions, irrelevant comments, and codeswitching were excluded from the analysis. To investigate lexical production, we used two measures: total number of words (TNW), as a measure of narrative length, and number of different words (NDW), as a measure of lexical diversity. These measures have been used in many studies investigating lexical knowledge in mono- and bilingual children acquiring different languages (e.g., Uccelli and Páez, 2007; Simon-Cereijido and Gutiérrez-Clellen, 2009; Bedore et al., 2010) as well as studies focusing on typical vs. impaired language development (e.g., Watkins et al., 1995; Klee et al., 2004; Hewitt et al., 2005). For typically developing bi- and monolingual children, TNW and NDW are shown to systematically increase with age from preschool to primary school. NDW also tends to be a more sensitive measure than TNW and a better indicator of language growth, since it reflects diversity of vocabulary. In studies of children with language impairment, NDW is found to be consistently lower than that of typically developing peers (e.g., Watkins et al., 1995). For Spanish-English bilinguals in Uccelli and Páez (2007), TNW failed to capture meaningful developmental changes, while NDW was

TABLE 2 Means, standard deviations, and ranges for the total number of words (TNW) and number of different words (NDW) for German-Russian, Norwegian-Russian, English-Russian, and Russian monolingual children.

| Measures | German-Russian mean (SD), range | | Norwegian-Russian mean (SD), range | | English-Russian mean (SD), range | | Russian monolinguals mean (SD), range | |
|---|---|---|---|---|---|---|---|---|
| | Preschool | School | Preschool | School | Preschool | School | Preschool | School |
| TNW Russian | 47.97 (20.27), 14–107 | 69.21 (30.48), 6–135 | 36.1 (23.66), 5–88 | 45.75 (15.03), 25–73 | 27 (NA), 27–27 | 68.94 (24.7), 30–120 | 60.5 (18.42), 24–101 | 74 (21.87), 52–142 |
| NDW Russian | 28.08, (9.44), 12–55 | 35.79 (12.52), 5–58 | 22.9 (14.36), 4–53 | 28 (8.49), 17–44 | 20 (NA), 20–20 | 35 (12.01), 13–64 | 31.62 (6.11), 20–44 | 40.93 (9.41), 30–71 |
| TNW societal | 65.27 (27.39), 12–127 | 102.56 (33.11), 46–201 | 66.62 (22.01), 31–99 | 102.27 (29.13), 61–180 | – | 142.45 (74.98), 30–296 | – | – |
| NDW societal | 30.58 (10.57), 10–53 | 44.74 (9.94), 27–70 | 32.88 (6.96), 20–41 | 45.4 (10.38), 33–74 | – | 50.18 (16.41), 18–73 | – | – |

found to be a sensitive measure, since the bilinguals' lexical diversity increased significantly by age in one of their languages (English). Similarly, NDW increased by grade and was significantly associated with literacy outcomes of Spanish-English bilinguals in Miller et al. (2006). In our own research, NDW was found to be a better predictor of bilinguals' sensitivity to grammatical gender cues in RHL than TNW (Mitrofanova et al., 2018; Rodina et al., 2020).

A different line of research has been concerned with the reliability of the two lexical productivity measures for comparing mono- and bilingual vocabulary knowledge in storytelling across typologically distant languages: Based on the MAIN narratives of Croatian-Italian bilinguals ($n$ = 30, age range 5–7), Hržica and Roch (2021) compare and validate the ability of TNW and NDW as well as the so-called model-based measures to adequately reflect bi- and monolingual children's lexical abilities.[2] It is shown that TNW and NDW are able to detect similarities and differences in bi- and monolingual performance as well as performance between languages in bilingual speakers, despite the fact that they are highly sensitive to variability in sample size and language-specific features (morphological richness, diversity of functional words and word segmentation principles). TNW and NDW are also shown to effectively predict bilinguals' receptive vocabulary scores for each language measured by PPVT.

The present study further contributes to the validation of the TNW and NDW measures in assessing bilingual children's lexical development.

## 4. Results

The means, standard deviations, and ranges for the two measures for all participant groups are presented in **Table 2**. In Russian, all bilingual groups show lower TNW and NDW than their monolingual peers. The German-Russian group scores the highest among the bilinguals in both pre- and primary-school subgroups. For all participant groups, the means for TNW and NDW improve with age, but the increase is considerably smaller for the Norwegian-Russian group, which is particularly clear in the primary school subgroup, where they score much lower on both measures. Note, that there was only one child of preschool age in the English-Russian group, which makes these results difficult to compare to the rest of the sample. The means for TNW and NDW are higher in the societal than in the heritage language for all bilingual groups. The German-Russian and Norwegian-Russian groups perform similarly on both measures and the English-Russian school-aged children produce the highest scores.

In what follows, we focus on the analysis of lexical development patterns in RHL and the factors that may explain them. The statistical analysis of lexical development in RHL revealed that age and preschool start both had significant effects on the development of the NDW ($p$ = 0.002 and $p$ = 0.01, respectively) and the TNW ($p$ = 0.009 and $p$ = 0.001, respectively).[3] **Figure 1** represents the change in the NDW by country with age as a continuous variable. As evident from the figure, NDW increases with age in all groups. At the same time, we can also see that Russian monolinguals score the highest, followed by participants from Germany and the UK, who performed similarly

2 Model-based measures applied in Hržica and Roch (2021) were measure D, moving average type-token ratio, and hypergeometric diversity of D.

3 All analyses were performed using R Statistical Software (v4.0.3; R Core Team, 2021).

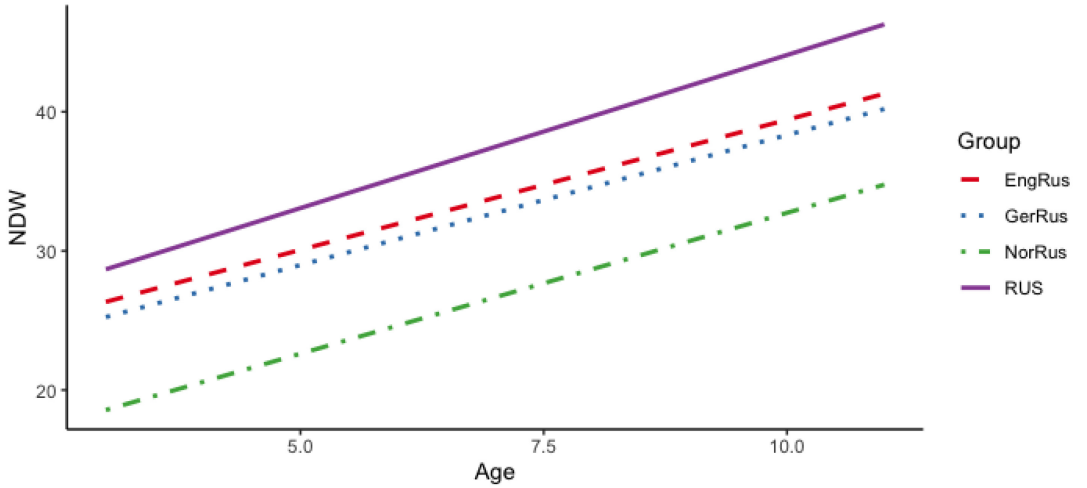



FIGURE 1
Number of different words (NDW) per narrative in Russian heritage language (RHL) as a function of age and country.

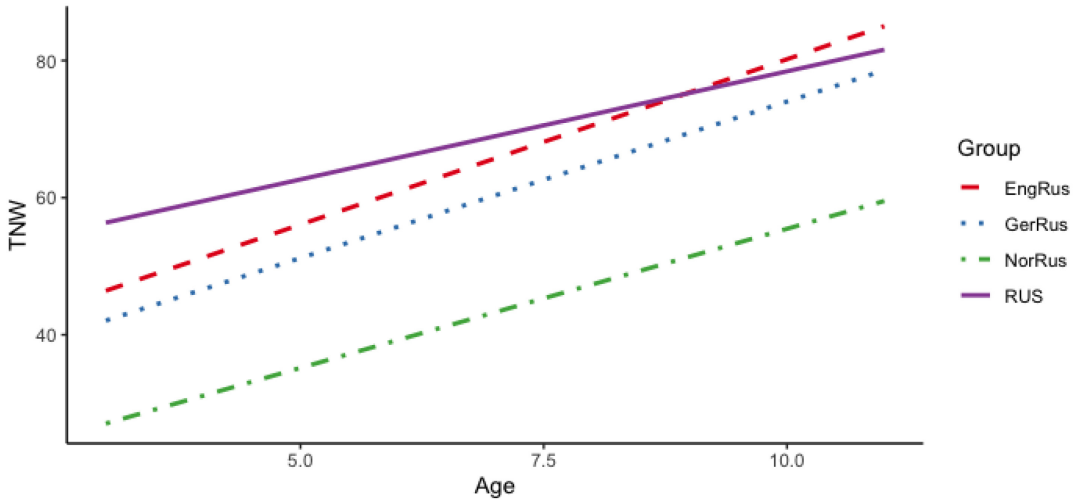



FIGURE 2
Total number of words (TNW) per narrative in Russian heritage language (RHL) as a function of age and country.

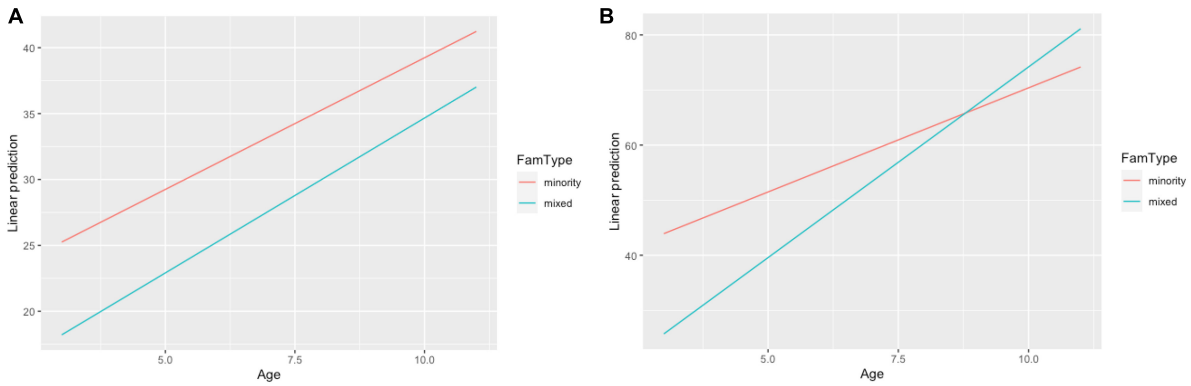



FIGURE 3
Linear trends for the development of number of different words (NDW) **(A)** and total number of words (TNW) **(B)** as a function of age and family type in Russian heritage language (RHL).

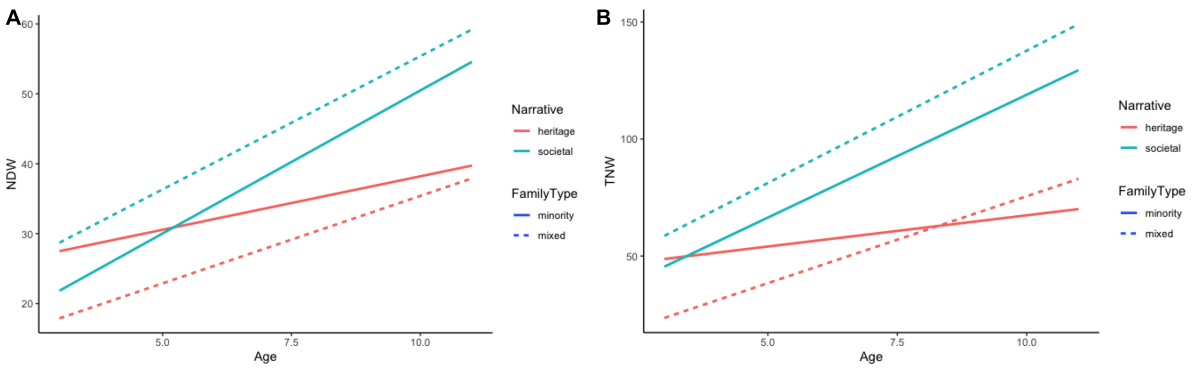



FIGURE 4
Development of number of different words (NDW) **(A)** and total number of words (TNW) **(B)** in the societal and heritage language as a function of age and family type.

to each other. Participants from Norway produced the lowest NDWs as a group. Recall that the preschool start varies per country, with children in Norway starting preschool at age 1, while children in Germany and the UK typically start at age 3–4.[4]

Turning now to our measure of narrative length, the TNW, Figure 2 illustrates changes in this measure with age by country. As evident from the figure, the TNW also increases with age for all participant groups. Interestingly, the participants from Germany and the UK seem to catch up with the monolingual Russian-speaking children in narrative length, while the bilingual children from Norway consistently produce shorter narratives.

Another variable that has been shown to significantly predict bilinguals' language development in the HL is family type, i.e., whether both or only one of the parents uses the HL when speaking with the child (Unsworth, 2013; Rodina and Westergaard, 2017; Mitrofanova et al., 2018). To analyze the results statistically, we ran a linear regression analysis where two lexical variables (NDW and TNW) were predicted as an interaction of family type (mixed vs. minority) and age, with preschool start as an independent predictor. *Post hoc* comparisons of estimated marginal trends confirmed a significant effect of age for children from mixed as well as minority language families, for both the NDW ($p$ = 0.002 for both family types) and the TNW ($p$ = 0.0001 for mixed and $p$ = 0.01 for minority language families). Figures 3A, B illustrate these linear trends for the NDW and the TNW, respectively as predicted by the models. The statistical analysis and the figures demonstrate that children from mixed families exhibit a steeper developmental change in the overall narrative length (TNW) and eventually catch up with the children from minority language families (3b). At the same time, the development of the NDW measure proceeds in parallel for children from mixed and minority language families (3a).

Finally, we also compared the dynamics of narrative development in both the heritage and the societal language of the bilinguals. Figures 4A, B summarize the effects of age on the two narrative indices in the two languages by family type (mixed vs. minority families). To compare the dynamics statistically, we ran a linear regression analysis where the two narrative indices were predicted as a three-way interaction of family type (mixed vs. minority), language (heritage vs. societal), and age. The analysis revealed a significant interaction of age and language for both indices, the NDW ($p$ = 0.015) and the TNW ($p$ = 0.006), suggesting that the difference between the narrative skills in the two languages becomes significantly larger with age (indicating steeper development in the societal as compared to the HL).

## 5. Discussion

In the (Section "3.1. Research questions") we asked the following research questions, which we now discuss in turn:

> RQ1: How does lexical development proceed in RHL of pre- and primary-school children?
>
> RQ2: How does the shift in language input and use during school-age affect lexical development in RHL, if at all? More specifically, are there signs of stabilization or stagnation of vocabulary development?
>
> RQ3: Which individual background factors can explain the variance in lexical knowledge in the oral narratives of RHL speaking children?

The results displayed in Table 2 and Figures 1, 2 may be used to answer RQ1. Lexical development in RHL is characterized by a clear and steady increase with age for both of our main lexical productivity measures, TNW and NDW. That is, the children go through a gradual and even development with respect to the TNW and NDW used in their narratives. In the preschool years for both measures, the differences between the monolinguals and the three groups of RHL speakers are relatively constant throughout development, with the Russian monolinguals having the highest rate of lexical diversity, the Norwegian-Russian group the lowest, and the RHL speakers in Germany and the UK in the middle. During primary school, all bilingual groups show age sensitive development for both measures, but while the RHL children in Germany and the UK catch up with the monolinguals, the children from Norway perform significantly lower. The higher lexical productivity of the German-Russian and English-Russian children may be attributed to their later start of the preschool (at around the age of 3) and hence a later onset of regular exposure to the societal language, as compared with the Norwegian-Russian bilinguals. We return to this issue in connection to RQ3.

4 It is possible to start preschool at age 1 in Germany and the UK; however, none of our participants reported starting preschool earlier than age 3.

Not surprisingly, the comparison of lexical development in RHL and in the societal language in **Table 1** and **Figure 4** reveals an advantage of the latter, but the differences are not dramatic, and importantly, there is parallel development from pre- to primary-school in both languages. Furthermore, it is clear that there is considerable individual variation not only in RHL, but also in the societal language in all participant groups. Overall, the growth of expressive vocabulary that we observe in the preschool years is similar to the one reported in Czapka et al. (2021). However, in contrast to Montanari et al.'s (2020) results, there is no stagnation in the vocabulary growth in RHL of our participants from Germany or other countries. With the differences in the methodologies in mind (picture-naming in Montanari et al. (2020) vs. oral narratives in the current study), a possible explanation could be that, at the onset of primary school, the Russian-speaking 6-year-olds in Montanari et al. (2020) had a larger vocabulary than the same-age bilinguals in the present study. As a result, the vocabulary growth may appear more pronounced in the current data sample.

The observed developmental trajectory is yet unexpected, since in connection with RQ2 we predicted to see a certain reduction or stagnation in the lexical development of the RHL speakers at the onset of primary school. While this is of course a very positive state of affairs for the RHL children involved, it is somewhat surprising, considering the emphasis that is put on the change in language dominance in HL research. In fact, this dominance shift is often part of the definition of what a HL speaker is (e.g., Montrul, 2016). So why do we not see a stagnation in our HL data? One speculation is that our findings could be due to the fact that this is a cross-sectional study, not a longitudinal one. Thus, there may be some self-selection in the type of speakers who have participated in our study. That is, the oldest children that we have recruited are HL children who have continued learning Russian (both at home and in HL instruction), and who have therefore felt confident about participating in our study. There is of course a possibility that there are many other RHL children at this age who have not reached this level of Russian. But even so, our findings suggest that a drop in lexical diversity in the HL is not a necessary consequence of a dominance shift resulting from starting school and thus an increase in exposure to the majority language. We return to this issue below when we discuss the effects of family type on lexical productivity.

Our data show that the individual variation among our RHL children is substantial (**Table 2**). Our RQ3 asks what factors may account for this variation in lexical diversity among the RHL children across different countries. In addition to age (which is clearly a significant factor, the children are gradually increasing their lexical diversity with time), the timing of start in preschool is an important factor, as also found in our previous work (Mitrofanova et al., 2018; Rodina et al., 2020) as well as in previous work on RHL in Germany where larger vocabulary size in RHL was found to correlate with later age of onset of German (Czapka et al., 2021). This accounts for the Norwegian-Russian children having a lower lexical diversity in the HL from the very beginning of language acquisition, a situation that persists throughout childhood. As mentioned above, children growing up in Norway generally start preschool already at age 1, which means that they have massive exposure to the majority language even in their pre-linguistic stage. In contrast, Russian HL children in Germany and the UK normally do not start preschool until the age of three, which means that they have ample time to develop the lexical and grammatical skills of the HL before being exposed to large proportions of the majority language.

Another important factor is family type, i.e., whether the children grow up with one or two Russian-speaking parents. **Figure 4A** shows that children growing up in homes where they get mixed input generally score lower on the NDW measure for the HL than the children who are only exposed to Russian at home, while they score higher on the majority language. Importantly, the children from mixed-input families also score better on the majority language than the HL, and this is a situation that increases over time. In fact, this measure indicates that the dominance shift should only occur in the development of the children with two Russian-speaking parents, since the children who get input from both languages in the home (i.e., a mixed family type) are dominant in the majority language from the very beginning and throughout development. This also means that the stagnation that we expected to see in **Figures 1**, **2** is somehow concealed by the fact that the data of children from different family types are mixed in those graphs. When the data are separated by family type as in **Figure 4A**, we see that lexical diversity development in the HL slows down considerably compared to the lexical development of the majority language, but only for the children who grow up with two Russian-speaking parents. That is, the lexical development in the majority language has a much steeper slope than the slope for the HL, which only shows a slight increase over time. The fact that there is positive development in the majority language, especially in children where both parents are speakers of Russian, highlights the importance of HL preservation in the family context which ensures HL maintenance in child bilinguals, and, at the same time, does not hinder development in the societal language. A similar conclusion has been reached in Gagarina et al. (2014) based on the evidence from German-Russian and Hebrew-Russian bilinguals and there are also studies where positive interaction between HL vocabulary skills and L2 vocabulary acquisition has been found (e.g., Grøver et al., 2018).

In line with previous research, including recent studies on vocabulary acquisition in RHL (e.g., Klassert et al., 2014), we also see in **Figure 4** that the two lines for HL and majority language development cross around age 5 for the children from families with two Russian-speaking parents, indicating that the dominance shift occurs already at this young age in this group of RHL children. This finding is compatible with the reversed accentedness pattern that we observed in an earlier study with the same group of German-Russian bilinguals, where the incidence of a perceived foreign accent decreased from younger (preschool) to older (primary school) children in German, while it increased for Russian (Kupisch et al., 2021). While no such shifts have been attested in our previous studies investigating the acquisition of grammatical gender in RHL in the same participant groups, it is clear that all three linguistic domains are affected by input factors, with language exposure in the home in terms of family type (HR family vs. mixed family) and age of starting preschool as the major predictors. Overall, the results from lexical, grammatical, and phonological acquisition in pre- and primary-school bilinguals seem to support the view that having longer exclusive or uninterrupted exposure to a HL in early childhood is beneficial for HL development and outcomes (cf., Bar-Shalom and Zaretsky, 2008; Lloyd-Smith et al., 2020). At the same time, it is not straightforward from our dataset whether lexical development is more susceptible to input factors than grammatical development. Our in-depth investigation of gender assignment in RHL in a large data sample of bilinguals from five different national contexts–Germany, Norway, the UK, Latvia, and Israel–showed that the bilingual children were sensitive to morphophonological cues

for gender assignment, although they were less target-like than monolinguals (Mitrofanova et al., 2018, 2022; Rodina et al., 2020). Further examination of the bilinguals' individual profiles showed that while the masculine-feminine-neuter distinction was present in the majority of bilinguals across all countries (174/211, 83%), there was still a certain number of children (37/211, 17%) who had difficulties acquiring neuter or grammatical gender altogether. Taken together, the developmental patterns from lexical and grammatical acquisition in RHL can be used to conclude that variation is an inherent characteristic of the heritage speaker population.

Finally, the results of the present study contribute to an ongoing debate as to what extent lexical productivity measures, such as TNW and NDW, reflect general lexical knowledge of bilinguals. Our results suggest that both of these narrative productivity measures are sensitive indicators of lexical development and are able to detect developmental patterns across typologically different languages of bilingual speakers. Both measures increased significantly by age, but the measure of lexical diversity (NDW) was also able to detect a shift in lexical development in the group of bilinguals from the HL families (**Figure 4A**). Thus, corresponding to previously made observations, there is a tendency for NDW to be a more sensitive measure than TNW in the current data sample. Overall, we can conclude that the general lexical knowledge of bilinguals can be reliably established based on relatively short and variable samples of spoken narratives, presenting potential for overall bilingual language assessment, especially of languages for which (adequate) assessment materials are unavailable.

The current study has several limitations which are likely to affect our ability to fully and objectively explore lexical development in HSs. Our participants were recruited and tested in different Russian language centers where they received additional HL support. Therefore, despite considerable variation in performance, our sample may be biased toward motivated and proficient HL learners. Ideally, we should have included bilinguals who do not receive additional HL support. This would also provide further insights about the role of HL education or lack of thereof on bilinguals' language development. Furthermore, the sample sizes of the three participant groups varied greatly and were rather small for the Norwegian-Russian and especially the English-Russian group, where there were also no preschool children. Methodologically, the study could have benefited from including other lexical measures and tasks (e.g., picture-naming) which would have allowed a more direct comparison of lexical development in RHL across studies. Given the diversity of the HL communities within and across different national contexts, future research conducted in new HL communities will likely advance the discussion of the impact of the socio-linguistic environment on HL development and maintenance.

## 6. Conclusion

In this paper, we have analyzed lexical development in three populations of Russian heritage children growing up in Norway, Germany, and the UK, comparing both the heritage and the majority language of the bilingual children. Furthermore, a comparison is made with monolingual children growing up in Russia. Data have been collected using the elicitation material in the Multilingual Assessment Instrument for Narratives (MAIN), from which two lexical measures have been extracted, total number of words (TNW) and number of different words (NDW), measuring narrative length and lexical diversity, respectively. Results show that there is a gradual increase in both measures in both languages of the bilinguals, but that the bilinguals generally score lower than the monolinguals in Russian, and the bilinguals from Norway score considerably lower than the heritage children in Germany and the UK. The latter finding is explained by the early exposure to the majority language in Norway, as most children start daycare at age one, while children in Germany and the UK do not start until age three or later. Indications of stagnation or dominance shift in the heritage language is only visible in the narratives of children with two Russian-speaking parents, as the children from mixed families are dominant in the majority language already from early on. Our results corroborate findings from other studies on heritage language children, showing that speaking a heritage language has no adverse effects on the development of the majority language.

## Data availability statement

The raw data supporting the conclusions of this article will be made available on request to the corresponding author.

## Ethics statement

The studies involving human participants were reviewed and approved by the Norwegian center for research data. Written informed consent to participate in this study was provided by the participants' legal guardian/next of kin.

## Author contributions

NM, YR, and MW carried out the collection of data with bilingual participants. YR carried out the collection of control data with monolingual Russian children and had the main responsibility for finalizing the draft. NM, AB, and YR are responsible for data transcription and analysis. All authors wrote the manuscript and are responsible for the conception and design of the study.

## Funding

This research was partially supported by a grant from the Research Council of Norway (RCN) for the project Microvariation in Multilingual Acquisition and Attrition Situations (MiMS), project code 250857 and through RCN's Centers of Excellence funding scheme, project number 223265. The publication charges for this article have been funded by a grant from the publication fund of UiT The Arctic University of Norway.

## Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

## Publisher's note



## References

Bar-Shalom, E. G., and Zaretsky, E. (2008). Selective attrition in Russian-English bilingual children: Preservation of grammatical aspect. *Int. J. Biling.* 12, 281–302. doi: 10.1177/1367006908098572

Bedore, L. M., Pena, E. D., Gillamb, R. B., and Hoa, T. H. (2010). Language sample measures and language ability in Spanish English bilingual kindergarteners. *J. Commun. Disord.* 43, 498–510. doi: 10.1016/j.jcomdis.2010.05.002

Bialystok, E., Luk, G., Peets, K. F., and Yang, S. (2010). Receptive vocabulary differences in monolingual and bilingual children. *Bilingualism* 13, 525–531. doi: 10.1017/S1366728909990423

Brehmer, B., and Kurbangulova, T. (2017). "Lost in transmission? Family language input and its role for the development of Russian as a heritage language in Germany," in *Integration, identity and language maintenance in young immigrants. Russian Germans or German Russians*, eds L. Isurin and C. M. Riehl (Amsterdam: John Benjamins), 225–268. doi: 10.1075/impact.44.c8

Czapka, S., Topaj, N., and Gagarina, N. (2021). A four-year longitudinal comparative study on the lexicon development of Russian and Turkish heritage speakers in Germany. *Languages* 6:27. doi: 10.3390/languages6010027

Dieser, E. (2009). *Genuserwerb im Russischen und Deutschen: Korpusgestützte Studie zu ein- und Zweisprachigen Kindern und Erwachsenen. [The Acquisition of Gender in German and Russian: A Corpus-Based Study with Mono- and Bilingual Children and Adults.]*. München: Sagner. doi: 10.3726/b12030

Dunn, L. M., and Dunn, D. M. (2007). *Peabody picture vocabulary test (PPVT-4)*, 4th Edn. Minneapolis, MN: Pearson. doi: 10.1037/t15144-000

Gagarina, N., Armon-Lotem, S., Altman, C., Burstein-Feldman, Z., Klassert, A., Topaj, N., et al. (2014). "Age, input quantity and their effect on linguistic performance in the home and societal language among Russian-German and Russian-Hebrew preschool children," in *The challenges of diaspora migration interdisciplinary perspectives on Israel and Germany*, eds R. K. Silbereisen, P. F. Titzmann, and Y. Shavit (Farnham: Ashgate Publishing), 63–82.

Gagarina, N., Fichman, S., Galkina, E., Protassova, E., Ringblom, N., and Rodina, Y. (2021). "How oral texts are organized in monolingual and heritage Russian. Evidence from six countries," in *Language Impairment in Multilingual Settings. LITMUS in action across Europe [Trends in language acquisition research, 29]*, eds S. Armon-Lotem and K. K. Grohmann (Amsterdam: John Benjamins), 47–76. doi: /10.1075/tilar.29.02gag

Gagarina, N., Klop, D., Kunnari, S., Tantele, K., Välimaa, T., Balciuniene, I., et al. (2012). Multilingual assessment instrument for narratives (MAIN). *ZAS Pap. Linguist.* 56, 1–140.

Gathercole, V. C. M., and Thomas, E. M. (2009). Bilingual first-language development: Dominant language takeover, threatened minority language take-up. *Bilingualism* 12, 213–237. doi: 10.1017/S1366728909004015

Grøver, V., Lawrence, J., and Rydland, V. (2018). Bilingual preschool children's second-language vocabulary development: The role of first-language vocabulary skills and second-language talk input. *Int. J. Biling.* 22, 234–250. doi: 10.1177/1367006916666389

Hewitt, L. E., Hammer, C. S., Yont, K. M., and Tomblin, J. B. (2005). Language sampling for kindergarten children with and without SLI: Mean length of utterance, IPSYN, and NDW. *J. Commun. Disord.* 38, 197–213. doi: 10.1016/j.jcomdis.2004.10.002

Hržica, G., and Roch, M. (2021). "Lexical diversity in bilingual speakers of Croatian and Italian," in *Language impairment in multilingual settings: LITMUS in action across Europe*, eds S. Armon-Lotem and K. Grohmann (Amsterdam: John Benjamins), 100–129. doi: 10.1075/tilar.29.04hrz

Jia, R., and Paradis, J. (2015). The use of referring expressions in narratives by Mandarin heritage language children and the role of language environment factors in predicting individual differences. *Bilingualism* 18, 737–752. doi: 10.1017/S1366728914000728

Klassert, A., Gagarina, N., and Kauschke, C. (2014). Object and action naming in Russian- and German-speaking monolingual and bilingual children. *Bilingualism* 17, 73–88.

Klee, T., Stokes, S. F., Wong, A., Fletcher, P., and Gavin, W. J. (2004). Utterance length and linguistic diversity in Cantonese-speaking children with and without language impairment. *J. Speech Lang. Hear. Res.* 47, 1396–1410.

Krüger, I. (2021). *Gender agreement patterns in heritage Russian. Ph.D. dissertation*. Humboldt University of Berlin.

Kupisch, T., Kolb, N., Rodina, Y., and Urek, O. (2021). Foreign accent in pre-and primary school heritage Bilinguals. *Languages* 6:96.

Laleko, O. (2010). *The syntax-pragmatics interface in language loss: Covert restructuring of aspect in heritage Russian. Doctoral dissertation*. Minneapolis, MN: University of Minnesota.

Laleko, O. (2022). Word order and information structure in heritage and L2 Russian: Focus and unaccusativity effects in subject inversion. *Int. J. Biling.* 26, 749–766.

Lloyd-Smith, A., Bayram, F., and Iverson, M. (2020). "The effects of heritage language experience on lexical and morphosyntactic outcomes," in *Studies in Turkish as a heritage Languages*, ed. F. Bayram (Amsterdam: John Benjamins), 63–86.

Makarova, V., and Terekhova, N. (2020). Russian-as-a-heritage-language vocabulary acquisition by bi-/multilingual children in Canada. *Russ. Lang. Stud.* 18, 409–421. doi: 10.22363/2618-8163-2020-18-4-409-421

Meir, N., and Janssen, B. (2021). Child heritage language development: An interplay between cross-linguistic influence and language-external factors. *Front. Psychol.* 12:651730. doi: 10.3389/fpsyg.2021.65173

Miller, J., Heilmann, J., Nockerts, A., Iglesias, A., Fabiano, L., and Francis, D. J. (2006). Oral language and reading in bilingual children. *Learn. Disabil. Res. Pract.* 21, 30–43.

Mitrofanova, N., Rodina, Y., Urek, O., and Westergaard, M. (2018). Bilinguals' sensitivity to grammatical gender cues in Russian: The role of cumulative input, proficiency, and dominance. *Front. Psychol.* 9:1894. doi: 10.3389/fpsyg.2018.0189

Mitrofanova, N., Urek, O., Rodina, Y., and Westergaard, M. (2022). Sensitivity to microvariation in bilingual acquisition: Morphophonological gender cues in Russian heritage language. *Appl. Psychol.* 43, 41–79.

Montanari, E., Abel, R., Tschudinovski, L., and Graßer, B. (2020). "Vocabulary development in the heritage languages Russian and Turkish between ages 6 and 10," in *Lost in Transmission: The role of attrition and input in heritage language development*, eds B. Brehmer and J. Treffers-Daller (Amsterdam: Benjamins), 151–170.

Montrul, S. (2016). *The acquisition of heritage languages*. Cambridge: CUP.

Otwinowska, A., Meir, N., Ringblom, N., Karpava, S., and La Morgia, F. (2021). Language and literacy transmission in heritage language: Evidence from Russian-speaking families in Cyprus, Ireland, Israel and Sweden. *J. Multiling. Multicult. Dev.* 42, 357–382. doi: 10.1080/01434632.2019.1695807

Pearson, B. Z., Ferñandez, S. C., and Oller, D. K. (1993). Lexical development in bilingual infants and toddlers: Comparison to monolingual norms. *Lang. Learn.* 43, 93–120. doi: 10.1111/j.1467-1770.1993.tb00174.x

Pearson, B. Z., Ferñandez, S. C., Lewedeg, V., and Oller, D. K. (1997). The relation of input factors to lexical learning by bilingual infants. *Appl. Psychol.* 18, 41–58. doi: 10.1017/S0142716400009863

Polinsky, and Maria. (2008). Gender under incomplete acquisition: heritage speakers' knowledge of noun categorization. *Heritage Lang. J.* 6, 40–71. doi: 10.46538/hlj.6.1.3

R Core Team (2021). *R: A language and environment for statistical computing*. Vienna: R Foundation for Statistical Computing.

Ringblom, N., and Dobrova, G. (2019). Holistic constructions in heritage Russian and Russian as a second language: Divergence or delay? *Scando Slav.* 65, 94–106. doi: 10.1080/00806765.2019.1586577

Rodina, Y. (2017). Narrative abilities of preschool bilingual Norwegian-Russian children. *Int. J. Biling.* 21, 617–635. doi: 10.1177/1367006916643528

Rodina, Y., and Westergaard, M. (2017). Grammatical gender in bilingual Norwegian-Russian acquisition: The role of input and transparency. *Bilingualism* 20, 197–214.

Rodina, Y., Kupisch, T., Meir, N., Mitrofanova, N., Urek, O., and Westergaard, M. (2020). Internal and external factors in heritage language acquisition: Evidence from heritage Russian in Israel, Germany, Norway, Latvia and the UK. *Front. Educ.* 5:20. doi: 10.3389/feduc.2020.00020

Schwartz, M., Minkov, M., Dieser, E., Protassova, E., Moin, V., and Polinsky, M. (2015). Acquisition of Russian gender agreement by monolingual and bilingual children. *Int. J. Biling.* 19, 726–752. doi: 10.3389/fpsyg.2018.01894

Scontras, G., Fuchs, S., and Polinsky, M. (2015). Heritage language and linguistic theory. *Front. Psychol.* 6:1545. doi: 10.3389/fpsyg.2015.01545

Sheng, L., Lu, Y., and Kan, P. F. (2011). Lexical development in Mandarin-English bilingual children. *Bilingualism* 14, 579–587.

Silvén, M., Voeten, M., Kouvo, A., and Lundén, M. (2014). Speech perception and vocabulary growth: A longitudinal study of Finnish-Russian bilinguals and Finnish

monolinguals from infancy to three years. *Int. J. Behav. Dev.* 38, 323–332. doi: 10.1177/0165025414533748

Simon-Cereijido, G., and Gutiérrez-Clellen, F. V. (2009). A cross-linguistic and bilingual evaluation of the interdependence between lexical and grammatical domains. *Appl. Psychol.* 30, 315–337. doi: 10.1017/S0142716409090134

Uccelli, P., and Páez, M. M. (2007). Narrative and vocabulary development of bilingual children from kindergarten to first grade: Developmental changes and associations among English and Spanish skills. *Lang. Speech Hear. Serv. Sch.* 38, 225–236. doi: 10.1044/0161-1461(2007/024)

Unsworth, S. (2013). Current issues in multilingual first language acquisition. *Annu. Rev. Appl. Linguist.* 33, 21–50.

Watkins, R. V., Kelly, D. J., Harbers, H. M., and Hollis, W. (1995). Measuring children's lexical diversity: Differentiating typical and atypical language learners. *J. Speech Hear. Res.* 34, 1134–1141. doi: 10.1044/jshr.3806.1349

Yan, S., and Nicoladis, E. (2009). Finding le mot juste: Differences between bilingual and monolingual children's lexical access in comprehension and production. *Bilingualism* 12, 323–335.

frontiers | Frontiers in Psychology

TYPE Original Research
PUBLISHED 28 March 2023
DOI 10.3389/fpsyg.2023.1080122



OPEN ACCESS

EDITED BY
Natalia Meir,
Bar-Ilan University,
Israel

REVIEWED BY
Tanja Rinker,
Catholic University of Eichstätt-Ingolstadt,
Germany
Magdalena Ewa Łuniewska,
University of Warsaw,
Poland

*CORRESPONDENCE
Annick De Houwer
annick.dehouwer@habilnet.org

SPECIALTY SECTION
This article was submitted to Language Sciences, a section of the journal Frontiers in Psychology

RECEIVED 25 October 2022
ACCEPTED 27 February 2023
PUBLISHED 28 March 2023

CITATION
De Houwer A (2023) Polish-German preschoolers develop and use heritage Polish differently depending on whether they heard German from birth or not.
*Front. Psychol.* 14:1080122.
doi: 10.3389/fpsyg.2023.1080122



# Polish-German preschoolers develop and use heritage Polish differently depending on whether they heard German from birth or not

Annick De Houwer*

Harmonious Bilingualism Network (HaBilNet), Rixensart, Belgium

This study assessed the language proficiency and use of a hitherto under-investigated group, *viz.*, 3.5-year-olds growing up with Polish as a heritage language and German as societal language. All children (*N*=28) heard Polish from birth in the home but half the children also heard German from birth (Bilingual First Language Acquisition, BFLA) while the other half added German through preschool (Early Second Language Acquisition, ESLA). All children attended German preschools. Data collection relied on an online survey filled out by 28 mothers and 20 fathers. There were large discrepancies between parental answers to general versus detailed questions regarding language use (choice) amongst parents and children. This has important repercussions for much of questionnaire based bilingualism research. Children were developing productive language as expected but BFLA preschoolers spoke German better or spoke both languages equally well whereas ESLA preschoolers spoke Polish better. Apart from BFLA children's much longer and daily exposure to German from birth, these BFLA-ESLA differences in relative Polish proficiency may relate to different current patterns of language choice, with (1) Polish less present in parent–child interactions involving BFLA than ESLA preschoolers, and with (2) BFLA but not ESLA preschoolers mostly hearing Polish from just a single parent. The BFLA-ESLA difference thus made a difference to children's heritage Polish development and use already at age 3.5.

KEYWORDS

**Polish, German, children, bilingual, language proficiency, language choice, preschool, parents**

## 1. Introduction

This introduction sets the scene for the empirical study to follow. It reviews several studies of non-societal language use (henceforth: heritage language, HL[1]) by children under age 12 (section 1.1) and factors supporting or threatening that use (section 1.2). Most of the relevant studies concern children over age 4.5. Yet HL use prior to that age may already reveal some of the dynamics we find in older children. The current study therefore focuses on 3.5-year-olds. As

1 The author prefers the term "non-societal language" but uses the term "heritage language" in the framework of the present Special Issue.

discussed in section 1.3, one major factor supporting or threatening HL use consists of parental home language choice patterns since children were born, i.e., did parents speak both a HL and the societal language (SocL) at home, or solely the HL? Section 1.4 explains how the questionnaire study reported on in this article investigates this factor for a hitherto infrequently studied population, i.e., Polish-German preschoolers. Amongst others, the questionnaire included both general and detailed questions about patterns of home language choice. Section 1.5 explains the reasoning behind this. Section 1.6 lists the research questions.

## 1.1. Patterns of heritage language use in early and middle childhood

Portes and Hao (1998) report that "the majority" (p. 273) of their large adolescent sample in the USA could not speak their parents' language. Large surveys reporting on bilingually reared younger children from across the world (Australia, Belgium, Canada, France, Japan) reveal massive intergenerational language loss of whatever HL they hear at home (De Houwer, 2020b): A fifth up to a quarter of bilingual school children may understand their HL but do not speak it. Smaller scale reports on primary school children (HLs-Arabic and Amazigh in Spain: Moustaoui, 2021; HL-Hebrew in the USA: Kaufman, 2001; HL-Japanese in the UK: Okita, 2002; HL-Russian in Germany: Anstatt, 2009; HL-Spanish in the USA: Anderson, 2012 and Buac et al., 2014) confirm these global findings. Furthermore, bilingually reared primary school children may speak their HL markedly less well than the SocL they hear at school (HL-Bangla in the UK: Al-Azami, 2014; HL-English in French-speaking Canada and Poland: Leśniewska and Pichette, 2018; HL-Japanese in the UK: Gyogi, 2015; for opposite findings, though, see HL-Russian in Israel and the Netherlands: Meir and Janssen, 2021, and HL-Russian in Cyprus, Ireland, Israel, and Sweden: Otwinowska et al., 2021). Bilingual primary school children may also show a different course of development for particular grammatical HL features than age-matched peers who speak that HL as their only language (HL-Hebrew in the USA: Kaufman, 2001; HLs-Polish and Portuguese in Germany: Rinke et al., 2019; HL-Portuguese in Germany: Flores et al., 2017; HL-Russian in Germany: Anstatt, 2009; HL-Russian in Israel and the Netherlands: Meir and Janssen, 2021; HL-Russian in Norway: Rodina and Westergaard, 2017).

Likewise, younger bilingual children may do less well in the HL than in the SocL. Twenty children between 4;5 (years;months) and 5;9 with HL-Polish in the UK did markedly less well on a Polish than an English lexical task (Abbot-Smith et al., 2018). Half of 89 mothers of sequential bilinguals aged 4;2 to 5;6 in Canada with SocL-English and a variety of different HLs reported "attrition in their child's L1 abilities and a preference for English compared to the L1" (Sorenson Duncan and Paradis, 2020, p. 52). A three-year longitudinal study of HL lexical and grammatical development in 34 HL-Spanish bilingual children in the USA who were on average aged 4;2 at the beginning of the study showed many patterns, including HL growth as well as HL attrition and loss, with some children hardly being able to speak the HL by age seven, although they spoke the SocL fluently (Hiebert and Rojas, 2021). The fact that HL performance can decline with age was also shown by Armon-Lotem et al. (2021), who found that older (ages 6;0–6;5) HL-English children in Israel scored worse on monolingual-based English tests than younger (ages 5;0–5;5 and 5;6–5;11) peers. Except for narrative skills, 88 bilinguals aged 4 to 7 (mean: 5;8) with HL-Polish in the UK had much lower Polish scores on several tests compared to monolinguals peers in Poland (Haman et al., 2017). The gaps remained the same regardless of age. Mieszkowska et al. (2017) found that 14 HL-Polish bilinguals and 14 HL-Polish trilinguals between ages 4;5 to 6;7 (mean: 5;6) in the UK did worse on standardized picture-naming and word-recognition tests compared to 14 age matched Polish monolinguals in Poland.

Like children in middle childhood, preschoolers may show a different course of development for particular HL features than age-matched peers who speak that HL as their only language. Schwartz et al. (2015) demonstrated this for 70 HL-Russian sequential bilinguals in Israel aged 4 to 5: Noun-adjective gender agreement error patterns were qualitatively similar for bilinguals and monolinguals, but quantitatively bilinguals resembled younger monolinguals rather than age-matched peers. Klassert et al. (2014) showed similar effects for HL-Russian noun naming by 60 Russian-German sequential bilinguals aged 4–7. Also in Germany, Brehmer and Rothweiler (2012) showed that German-Polish bilinguals had not completely acquired HL-Polish attributive adjective gender assignment by age 6.5, an unexpected result compared to Polish monolingual children.

On the other hand, preschoolers with exposure to both a HL and a SocL from birth often show similar morphosyntactic development compared to monolinguals peers in either language, although also within this population uneven development across languages is quite common. Children exposed to two languages from birth are growing up in a Bilingual First Language Acquisition or BFLA setting (Meisel, 1989; De Houwer, 2009, 2021).

HL vocabulary size has been at focus in a handful of studies on toddlers. Fifty-three bilingual toddlers in the UK and Ireland with HL-Polish had smaller Polish expressive vocabulary sizes than age matched monolingual peers in Poland (Miękisz et al., 2017). On the other hand, 31 toddlers aged 1;1 and 1;8 with HL-French in Dutch-speaking Flanders performed well within monolingual norms or even better (De Houwer, 2010). Rinker et al. (2017) found greater HL-Turkish than SocL-German production vocabulary for 19 children in Germany between 2;0 and 3;6 (most were BFLA). Ninety-two younger bilinguals (aged 1;6 to 2;6) in Germany produced up to three times as many HL-Turkish as SocL-German words (Budde-Spengler et al., 2021).

The above overview reveals that studies mostly concern primary school children or older preschoolers (starting in the fifth year of life). So far, few HL studies have concentrated on young preschoolers, that is, children aged three to four. It remains to be seen to what extent HL use in that younger population already shows signs of attrition or slower development.

## 1.2. Some explanations for patterns of HL use in early and middle childhood

Studies have investigated various factors to help explain patterns of HL use. Parents in the UK rated 18 HL-Polish 5.5-year-old

Abbreviations: BFLA, Bilingual First Language Acquisition; BILTALK, sub-questionnaire of the PEGEBOS-3 survey filled out by both parents; ESLA, Early Second Language Acquisition; HL, heritage language; PEGEBOS-3, online survey used for data collection; SocL, societal language.

bilinguals as having lower HL-Polish skills than parents of 18 peers in Norway (Hansen et al., 2019). There is some evidence that HL development patterns may be related to the specific languages involved. Czapka et al. (2021) undertook a longitudinal study of HL lexical development in 147 HL-Turkish or HL-Russian bilinguals in Germany who at pretest were on average aged 3;3; 119 children were still in the study by the fourth and last study wave, when children were on average aged 5;6. Results from a picture naming task showed different lexical growth trajectories for HL-Turkish and HL-Russian: At the last test point, lexical abilities were lower in the former. On the other hand, Rinke et al. (2019) found no differences between HL-Portuguese and HL-Polish direct object realization in 8-year-old bilinguals in Germany. Conversely, HL development patterns may be related to which SocL children are acquiring: Schwartz et al. (2015) found fewer HL-Russian gender agreement errors in sequentially bilingual preschoolers who were additionally acquiring a language with gender agreement than those who were not (but see Rodina et al., 2020, for a comparative five country study that failed to find an effect of the local SocL on older bilingual children's HL-Russian gender assignment).

Aside from the specifics of the particular languages involved, HL development may be affected by the age at which children started acquiring the SocL, with a later age supporting the HL (Armon-Lotem and Ohana, 2017; Armon-Lotem et al., 2021; Czapka et al., 2021; Meir and Janssen, 2021). Within a group of 457 children in Singapore aged between 4;1 and 6;6 with either Malay, Mandarin, or Tamil as HL those with lower proportions of HL home exposure had lower HL vocabulary sizes (Sun et al., 2020). In the realm of sentence interpretation, 32 children aged 6 to 12 with HL-Greek in the USA who had used the HL more before age five as well as concurrently did better than peers who had done so less (Chondrogianni and Schwartz, 2020). Sun et al. (2022) reported similar findings for 202 4- to 5-year-olds with HL-Mandarin in Singapore. In a very large population study in Spain, Caminal et al. (2021) showed that increased parental HL-Catalan proficiency led to parents speaking the HL more often with their firstborn children. Likewise, but now for 294 4- to 5-year-old bilinguals with HL-Mandarin in Singapore, Sun et al. (2022) found that higher maternal HL proficiency was associated with more frequent HL talk to their children. Rinker et al. (2017) found the same for HL-Turkish-speaking parents of two- and three-year-olds in Germany. Importantly, Sun et al. (2022) also found that maternal HL proficiency was related to children' receptive HL skills: The more HL proficient mothers were, the better children's HL performance. Mieszkowska et al. (2017) attributed greater SocL-English than HL-Polish vocabulary size in 14 bilinguals and 14 trilinguals between ages 4;5–6;7 to differences in the relative exposure to either language, with the SocL being more strongly present in children's lives. Haman et al. (2017) found that cumulative HL-Polish exposure helped explain children's production but not their comprehension skills. Budde-Spengler et al. (2021) found that higher parental education was related to toddlers' greater HL-Turkish vocabulary size.

Studies cited so far have mostly relied on parental reports as regards children's HL exposure. Studies focusing on observational data include Gaskins (2020), which found that high numbers of early verbs in two BFLA toddlers' HL-Polish in the UK could be traced to children hearing inflected Polish verbs in isolation and at the beginning and end of utterances more frequently than their uninflected English counterparts. Gaskins and Frick (2022) suggested that early multimodal interactions with two HL speakers may facilitate early HL development. De Houwer and Nakamura (2022) reviewed how parental responses to children's language choice can encourage children's HL use. However, children may resist such parental socialization patterns through discourse and insist on speaking solely the SocL (for potential explanations of such resistance, see De Houwer, 2020b). Sibling SocL use at home may lead to less HL talk by younger siblings (Mirvahedi and Cavallaro, 2020). As discussed next, a major explanation for patterns of HL development in children may relate to long-term parental language choice patterns.

## 1.3. A focus on parental language choice/use patterns and associated acquisition setting: BFLA and ESLA

Rodina and Westergaard (2017) found an influence of what they called "family type" in terms of parental home language use, here termed "language choice." They distinguished between families with children aged between 4;3 and 7;11 where both parents spoke just HL-Russian ($N = 10$) and so-called "mixed" families, where parents spoke both HL-Russian and SocL-Norwegian ($N = 10$) in Norway. Children's HL development was more advanced when both parents spoke just the HL at home. Rodina et al.'s (2020) study of 209 bilingual HL-Russian children between ages 3;0 and 10;0 (mean age around 6;0) in five countries confirmed this finding (this author calculated that 46% of children grew up in bilingual homes, that is, homes where parents spoke both a HL and a SocL). One can surmise that children who heard both languages from their parents at home had done so from birth, and were thus growing up in a BFLA setting. Parental language choice patterns in BFLA families are usually established when children are born, and do not change much in children's preschool years (De Houwer and Bornstein, 2016).

The 10 children in Rodina and Westergaard (2017) and the 55 children in Norway in Rodina et al. (2020) who heard just the HL at home started being exposed to the SocL at age one. The 154/209 children outside Norway in Rodina et al. (2020) started being exposed to the SocL at age three. All these children were experiencing an Early Second Language Acquisition (ESLA) setting (De Houwer, 1990, 2021), where regular exposure to a second language takes place after a period in which children under age six were acquiring just a single language in a monolingual family. Typically, such exposure arises through attending group child care or preschool in the local SocL. We know little about any changes over time in parental language choice patterns in ESLA families (De Houwer, 2021) but anecdotal reports mention that parents may add the SocL in their interactions with children in children's school years (De Houwer, 2020a).

The fact that Rodina and Westergaard (2017) and Rodina et al. (2020) found an influence on children's HL of "family type" is in line with findings based on a large ($N = 1{,}778$) investigation in Dutch-speaking Flanders of the influence of parental home language choice on child HL development (De Houwer, 2007; all families here had at least one child aged 6 to 9 who was attending school in the SocL). The five logically possible patterns of parental home language choice were all present: (i) parents both spoke just the HL, (ii) both parents spoke the HL but one parent in addition spoke the SocL, (iii) both parents spoke both the HL and the SocL, (iv) one parent spoke the HL and the other

one the SocL, and (v) both parents spoke the SocL and one parent the HL[2]. Rodina and Westergaard's (2017) and Rodina et al.'s (2020) "only the HL at home" coincides with pattern (i); their "mixed" category covers patterns (ii) through (v). Children growing up with pattern (i) are growing up in a monolingual family and acquiring the SocL as a chronologically second language, either through child care or preschool (ESLA), or through school after age six, in a Second Language Acquisition setting, when children start learning a new language in the spoken but also in the written mode (De Houwer, 2021). Children growing up with patterns (ii) through (v) are growing up within a bilingual family, presumably from birth, so in a (likely) BFLA setting[3].

De Houwer's (2018b) re-analysis of her 2007 survey data showed that only 70% of BFLA children spoke their HL. In contrast, (E)SLA children, who exclusively heard the HL at home, spoke the HL in 97% of (E)SLA families[4]. This large BFLA/(E)SLA difference points to the importance of parental language choice patterns in the home for explaining children's HL use in the primary school years, with the (E)SLA setting better supporting HL use, and confirms that "family type" is an important category for helping to explain HL development.

Whether the crucial point is that in monolingual families both parents speak the HL, as Rodina and Westergaard (2017) and Rodina et al. (2020) suggest, is another matter. De Houwer (2007) found no difference between "mixed" families where both parents spoke the HL and additionally one parent spoke the SocL (pattern ii), on the one hand, and families where both parents spoke just the HL (pattern i), on the other, in terms of whether they had children who spoke the HL or not. Furthermore, "mixed" families where both parents spoke both the HL and the SocL (pattern iii) had just as low a chance of having children who actually spoke the HL as "mixed" families where only one parent spoke the HL and the other one the SocL (pattern iv). (Pattern (v) families had the lowest chances of having a child who spoke the HL.)

The 70–97% difference between BFLA families on the one hand and (E)SLA families on the other (De Houwer, 2018b) suggests that it is the BFLA-ESLA difference rather than whether two parents speak the HL at home that is of fundamental importance. Although studies of young children's HL development may collect data on both BFLA and ESLA children and investigate the role of exposure (e.g., Armon-Lotem and Ohana, 2017; Haman et al., 2017; Hansen et al., 2019) virtually none examine the extent to which exposure to the HL and the SocL from birth has a potentially different effect than if exposure to the SocL happened only after children were in a monolingual home environment for some time. The main goal of the present study is to examine the influence of a BFLA versus an ESLA acquisition setting on bilingual children's HL development.

We know that the difference between BFLA and ESLA plays a major role for the HL once children are in primary school (see above). Budde-Spengler et al. (2021) found no differences between HL-Turkish production vocabulary size in toddlers up to age 2.5 in Germany who heard both HL-Turkish and SocL-German (BFLA) or only HL-Turkish (ESLA) at home. It is possible that age 2.5 is too young for BFLA-ESLA differences to show up. The current study with children who were a year older (around age 3.5) examines the extent to which an influence can be seen at early preschool age, thus keeping chronological age and overall time for acquiring the HL constant. A focus on young preschoolers fills a gap in the research literature on HL development, where, as reviewed above, it is virtually absent[5].

Within the broad distinction between BFLA and ESLA families there might be additional family language choice patterns that are of importance. Parental home language choice patterns may have changed in the course of the early years. This may have happened in response to children's own language choice patterns. For instance, once children start attending child care or preschool in the SocL they may add the SocL in interaction with parents with whom they were previously solely speaking a HL (De Houwer, 2017a). This in turn might lead parents to adjust their own language choice patterns, away from the HL (De Houwer, 2020a). Another reason for changes in home language choice patterns may be families' increased experience with living in a language contact situation, with the associated need to adjust to people outside the family. HL-speaking parents may also become more proficient in the SocL, increasing the chance they will start speaking (more of) the SocL at home. Before any reasons for possible changes in family language choice patterns can be investigated, however, one needs to know what these patterns consist of. This is why this study also considers family language choice patterns.

## 1.4. Substantive contribution: A focus on HL-Polish with German as SocL

In this likely first systematic comparison of BFLA and ESLA preschoolers' HL use and experience, the focus is on Polish-German-speaking children and their families with HL-Polish and SocL-German[6]. Data were collected in Germany and Austria, where German is the SocL used in public life, education institutions, and in child care and preschool. This study is part of a larger project on early bilingualism involving SocL-German that examines HL-English as well, in a bid to investigate the potential of HL status differences on HL development. English is a high status language in German-speaking countries, whereas Polish is not (Plewnia and

2 These categories were made on the basis of survey data specifying which language(s) each parent in a family spoke at home on the whole. There were no data on what language(s) parents specifically addressed to children or each other.

3 With the caveat that some parents in monolingual HL-speaking families may have started to also speak the SocL at home after children started attending school.

4 Information on the ages at which the children in De Houwer (2007) who did not hear the SocL at home first started attending (pre)school in the SocL is unavailable. Given the fact that nearly all children in Flanders attend preschool most children who did not hear the SocL at home likely started hearing the SocL in preschool, and were thus ESLA children.

5 A notable exception is Czapka et al. (2021), who included children aged 2;1 to 4;1 at pretest (mean of 3;3). Note, however, that the range here is quite large, with some children having lived twice as long as others at pretest, thus potentially masking developmental differences within this wide age range.

6 The terms "Polish" and "German" are meant to refer to the respective languages unless otherwise noted.

Rothe, 2011). The decision to focus on HL-Polish rather than other low status HL-languages in Germany such as HL-Russian or HL-Turkish (Plewnia and Rothe, 2011) was founded in the existence of several other studies on those HLs in Germany (see review above) and on the scarcity of studies there focusing on early HL-Polish development (see below). Thus this study makes a substantive contribution as well, uncovering realities of language use and development within bilingual Polish-German preschoolers.

In Germany people of Polish descent represent the second largest group of people with a migration background (Statistisches Bundesamt, 2020). In Austria individuals of Polish descent represent the seventh largest immigrant group (Statistik Austria, 2020). The brief literature overview here focuses on HL-Polish in Germany only. Relevant sources for Austria were not found.

Polish is widely spoken in Germany (Brehmer and Mehlhorn, 2020; Brehmer and Sopata, 2021). HL-Polish has been studied in primary school aged children (Rinke et al., 2019), adolescents (Brehmer et al., 2016; Brehmer, 2017), older teens (Anstatt, 2013; Besters-Dilger et al., 2015; Pułaczewska, 2019), and adults (Brehmer and Czachór, 2012; Besters-Dilger et al., 2015; Anstatt and Mikić, 2022).

Studies involving Polish-German bilingual children under age six living in Germany are few and far between (Table 1, order of studies according to date of publication). Studies focused on the HL or the SocL (or both). Group studies in Table 1 are difficult to interpret because they collapsed data for several HLs and/or for younger and older children, possibly masking important age related differences. They combined BFLA and ESLA children within their analyses or did not indicate whether children acquired both languages from birth or not. This makes it impossible to assess the effect of a BFLA vs. an ESLA setting on HL-Polish development. Where relevant, findings from studies in Table 1 are cited in the Discussion section to the current study.

TABLE 1 Studies involving Polish-German preschoolers in Germany *.

| Study | *N* children | Age(s) | Focus | Comments | Information re BFLA/ESLA? |
|---|---|---|---|---|---|
| Reich (2009) | 6 | Anywhere between 3;6–6;9 | Overall HL and SocL development | Part of group of 36 children with additional HLs; no separate analyses for Polish | No |
| Sopata (2011) | 4 | Anywhere between 2;8–5;8 | Use of SocL infinitives | 10-month long longitudinal observations per child | ESLA |
| Schneider (2012a) | 2 | (1) 1;0–9;0 (2) 4;0–12;0 | Language choice patterns between children, amongst family members, and outside the home | 8-year-long in depth double case study of two brothers (extension of Schneider, 2012b) | BFLA |
| Schneider (2012b) | 2 | (1) 1;0–5;0 (2) 4;0–8;0 | Interactions between children | 4-year-long double case study of two brothers (zooming in on part of the data discussed in Schneider, 2012a) | BFLA |
| Brehmer and Rothweiler (2012) | 34 | 2;11–6;5 | HL gender marking on attributive adjectives (*cf.* section 1.1) | Two elicitation tasks | Yes but not taken into account in analyses |
| Kulik (2016) | 13 | "Zwischen dem fünften und sechsten Lebensjahr" (p. 105) = between the 5th and 6th year of life | HL-Polish morphosyntactic proficiency (the use of case, verb morphology, and coordinate vs. subordinate clauses) and cross-linguistic transfer | Based on children's picture descriptions; part of a larger study with older children; also some overall parental assessments of children's proficiency in each language; no developmentally oriented analyses | No but all families used both the HL and the SocL (to different extents) |
| Schaefer et al. (2019) | 15 | Between 3;5–4;10 | Comprehension of 20 nouns and verbs in HL-Polish, HL-Turkist, and SocL-German | Results analyzed in combination with data from 21 Turkish-German peers | No |
| Sopata and Putowska (2020) | 29 | Between 4 and 11, mean 7;3 | Children's language choice patterns and overall percentage of "correctness" of children's HL-Polish in an elicitation task | No separate analyses for preschoolers | No |
| Sopata and Długosz (2022) | 58 | Between 4;11 and 13;9, mean 9;3 | Grammatically correct performance on a SocL sentence repetition task | No separate analyses for preschoolers | No |
| Jachimek et al. (2022) | 1 | 1;4–4;0 | Longitudinal study of the use of modifiers in HL-Polish and SocL-German noun phrases | | BFLA |

*Participant age ranges in Sopata et al. (2021) and in Brehmer and Sopata (2021) suggest that these studies included at least one or two Polish-German preschooler(s) but lack further information.

### 1.5. Methodological contribution: A focus on different ways of asking the same thing

Most of the studies reviewed above rely on responses to parental questionnaires. They take parental responses about home patterns of language choice at face value. However, the author's experience in working with many bilingual families over several decades has often laid bare discrepancies between parental claims about their and their children's language choice patterns on the one hand, and actual practices on the other. This is why in the design of the study both general and detailed questions about language choice were included. Detailed questions focus the participants' attention more, and give pause to reflect better. Thus some discrepancies in comparison with more general questions are to be expected.

Studies relying on parental responses to questionnaires usually do not state which parent(s) filled out the questionnaire. The present study aimed particularly to involve both parents, thus adding a level of reliability. The addition of information supplied by both parents may, however, lead to additional discrepancies with information provided by a single source.

### 1.6. Research questions

To summarize, this study aims to answer the following research questions:

1. (RQ1) does growing up in a BFLA vs. an ESLA family make a difference for HL development and use in 3.5-year-olds?
2. (RQ2) what are the patterns of HL-Polish development and use amongst 3.5-year-olds and their parents in a German-speaking society, and do these patterns differ depending on family type (BFLA or ESLA)?
3. (RQ3) are parental answers to general questions about language choice mostly in line with answers to detailed questions about language choice?

## 2. Method

### 2.1. Instruments

This study is part of a longitudinal study on Polish-German and English-German early bilingualism. Data were collected around children's second birthdays (Wave1), 9 months later (Wave2), and another 9 months later (Wave3).

The present study concerns Wave3 data for families who spoke Polish at home collected through the Polish-German and English-German Early Bilingualism Online Survey-3 (PEGEBOS-3; De Houwer, 2017b). PEGEBOS-3 centered on parents' 3.5-year-old children, family composition, residences, vacations, child care arrangements, and overall patterns of family language use. The analyses below discuss responses to parts of PEGEBOS-3 and to selected components of BILTALK, Talk and Interaction Questions for Parents in Bilingual Settings (De Houwer, 2018a), a sub-questionnaire asking both mothers and fathers on a more detailed level about language interaction with 3.5-year-olds. BILTALK also queried children's language proficiency. There were also questions about using both languages in a conversation and sentence (not covered here). Questionnaire items are further described below where relevant.

PEGEBOS-3 exists in English and Polish. BILTALK additionally exists in German. The present study relies on German and Polish versions. When in the following survey items are mentioned in English, they represent translations of German or Polish equivalents.

### 2.2. Respondents

The focus is on 28 families within the larger study who contributed data at each of the three Waves. Respondents were parents of children who had been regularly hearing Polish and German from birth within the family (BFLA families, $N = 14$) or Polish only (ESLA families, $N = 14$), as declared at recruitment.

Families were recruited after parents took the initiative to contact the research team in response to announcements through playgroups, Facebook groups, and word of mouth that we were looking for families to participate in a study on early Polish-German bilingualism. Team members of Polish descent who were mothers of Polish-German toddlers had an extensive recruitment conversation with potential participants. Families who agreed to participate signed an informed consent form. It took nearly 2.5 years to recruit families who fulfilled the conditions and who were willing to invest their time and effort in the study over 1.5 years.

At recruitment target children were nearly 2 years old. For the ESLA families it was crucial that children had (or would have) the opportunity to regularly hear German outside the home. Parents were only recruited as an ESLA family if their toddler was attending a German-speaking preschool or parents confirmed they were planning on soon sending their child to such a preschool[7].

Families lived scattered throughout Germany (25) or Austria (3) at recruitment and for the duration of the study. In 13 BFLA families mothers had emigrated from Poland; in one BFLA family it was the father who had done so. Their partners were German speakers who had always lived in Germany or Austria. The larger presence of mothers of Polish descent in the mixed origin families reflects the fact that in Germany many more Polish women marry German men than the other way around (Pułaczewska, 2019). All BFLA target children were born in Germany (12) or Austria (2). All ESLA parents had emigrated from Poland. Nine ESLA target children were born in Germany; the remaining five were born in Poland but moved to Germany before age one.

At recruitment, most families consisted of mother, father, and at least one toddler (the target child); one ESLA mother was raising her toddler alone. There was no difference between BFLA and ESLA mothers', $t(26) = 0.720$, $p = 0.478$, or fathers' ages, $t(26) = 0.270$, $p = 0.789$ (Table 2, A).

Generally, parents were highly educated (Table 2, B). Considering the difference between seven BFLA parents with a doctoral degree and

7 In Germany one speaks of "Kindertagesstätten" (KiTas) when such a preschool offers all day care and education, and of "Kindergärten" when children stay for only half a day. Neither of these forms is part of the formal school system, which is only available for children aged six and up.

TABLE 2 Family demographic information (sections 2.2 and 2.3).

| | BFLA families | ESLA families |
|---|---|---|
| Total *N* | 14 | 14 |
| Parents who emigrated to Germany or Austria from Poland | 14 | 27 |
| Target children lived with both mother and father | 14 | 13 |
| **A**. Parental average age at recruitment | | |
| Mothers | 33.93 | 35.21 |
| Fathers | 38.69 | 37.14 |
| **B**. Parental education (highest degree) | | |
| Parents with a doctoral degree | 7 | 2 |
| Parents completed a Master's program | 18 | 17 |
| Parents completed a four-year college program | 1 | 1 |
| Parents completed secondary school | 1 | 7 |
| Parents completed middle school | 1 | 0 |
| **C**. Parental work status | | |
| Fathers worked full-time outside the home | 12 | 13 |
| Mothers worked full-time outside the home | 3 | 1 |
| Fathers worked part-time outside the home | 2 | 0 |
| Mothers worked part-time outside the home | 5 | 5 |
| Mothers did not work outside the home | 6 | 7 |
| Maternal work status unknown | 0 | 1 |
| **D**. Parental reported language proficiency | | |
| Mothers… | 14 | 14 |
| …fluently spoke both Polish and German | 13 | 5 |
| …fluently spoke Polish and could manage in German | 0 | 4 |
| …fluently spoke Polish but hardly spoke any German | 0 | 5 |
| missing information | 1 | 0 |
| Fathers… | 14 | 13 |
| …fluently spoke both Polish and German | 4 | 7 |
| …fluently spoke Polish and could manage in German | 0 | 3 |
| …fluently spoke Polish but hardly spoke any German | 0 | 3 |
| …fluently spoke German and could manage in Polish | 4 | 0 |
| …fluently spoke German but hardly spoke any Polish | 5 | 0 |
| missing information | 1 | 0 |
| Mothers and fathers combined… | 28 | 27 |
| …fluently spoke both Polish and German | 17 | 12 |
| …fluently spoke Polish; spoke German (much) less well | 0 | 15 |
| …fluently spoke German; spoke Polish (much) less well | 9 | 0 |
| missing information | 2 | 0 |
| **E**. Children started attending preschool… | | |
| Before age 3 | 11 | 8 |
| Around age 3 | 3 | 4 |
| Missing age data | 0 | 2 |
| **F**. Target children's sibling status at Wave3 | | |
| Only child | 4 | 1 |
| Firstborn | 5 | 4 |

*(Continued)*

TABLE 2 (Continued)

| | BFLA families | ESLA families |
|---|---|---|
| Older sibling(s) | 3 | 7 |
| Older and younger sibling(s) | 2 | 2 |
| **G**. Any family trips longer than a week between children's third birthday and Wave3? | | |
| No | 5 | 4 |
| Yes, but no trips to Poland | 2 | 1 |
| Yes, including a single trip to Poland | 5 | 5 |
| Yes, including two trips to Poland | 1 | 2 |
| Yes, including three trips to Poland | 1 | 2 |

seven ESLA parents with just secondary school BFLA parents were more highly educated than ESLA parents. All children except two in an ESLA family were growing up with at least one parent who had completed at least a Master's program.

At Wave3 most fathers were working full-time outside the home (Table 2, C). Mothers' employment was more variable. Parental employment status was similar for BFLA and ESLA families but differed mostly for fathers and mothers, with 26 of the former but only four of the latter working full-time outside the home.

Information supplied at Wave2 (Table 2, D) showed that 13 BFLA but only five ESLA mothers were fluent speakers of both Polish and German; this includes the German mother living with a Polish origin father. All BFLA fathers were fluent in German (including the Polish origin father) and had variable Polish proficiency. All ESLA parents spoke Polish fluently and had variable German proficiency. In one ESLA family no parent could speak German. More ESLA than BFLA parents fluently spoke Polish and more BFLA than ESLA parents fluently spoke German, $\chi^2(1, N=82)=7.253$, $p=0.007$.

## 2.3. Target children and family experience

Most families (12 ESLA, 10 BFLA) filled in the survey when target children were very close to age 3.5 (range: 3;5.20 [years;months.days] – 3;6.29). Five families (3 BFLA, 2 ESLA) did so a bit later (range: 3;6.30–3;8.23), and one BFLA family several months later (age 3;11.23). Although not all children were strictly speaking 3.5 years old (4 BFLA and 2 ESLA children were a bit older), they will be referred to as such.

All children were attending preschool by Wave3 (Table 2, E), most for about 30 h a week. Children occasionally heard staff speak additional languages than German, but these did not include Polish. All children were singletons (15 girls, 13 boys). There was no BFLA-ESLA difference in children's gender distribution, $\chi^2(1, N=28)=1.292$, $p=0.256$. PEGEBOS-3 asked whether there had been any serious health issues since children's third birthdays. None except one were reported (the exception was an ESLA child who underwent a hernia operation 4 months before Wave3).

In nine BFLA families, the first child they were raising bilingually was their 3.5-year-old (Table 2, F). In contrast, in nine ESLA families their 3.5-year-old was likely not the first child parents were raising with Polish in a German-speaking environment (PEGEBOS-3 did not query where older siblings grew up; they might have lived in Poland before this study's target children were born). In any case, as a group, BFLA and ESLA parents had had different experiences with (bilingual) parenting:

PEBEGOS-3 asked about any trips longer than a week that families took since their 3.5-year-olds' third birthdays (Table 2, G). No BFLA-ESLA differences in family travel to Poland emerged, $\chi^2(1, N=27)=0.898$, $p=0.445$.

## 2.4. Procedure and respondent coding

Families lived throughout a very large geographical area, most at great distance from the research team's base in central Germany. This rendered it impossible for families to come to the university for language tests or for researchers to make individual home visits, the latter also being logistically impossible because of the study's long length of time (full data collection for the entire sample took 4.5 years). Resources thus dictated the decision to run the study online (and through paper correspondence for aspects not reported here).

Parents were invited to fill in the online survey through an individualized email link, with the request to complete it within 2 weeks. Participants who were late were sent a reminder. The fact that some children were a bit older than 3.5 relates to some parents taking their time in completing the survey, in spite of several friendly reminders. Parents were free to choose in which language they wanted to fill in the survey (Polish or German).

It took about 20 min to complete PEGEBOS-3 and an additional 15 min to complete BILTALK. After completion of the survey through the online platform SurveyMonkey (as well as the return of additional instruments on paper used in this study, not reported here), target children were sent a small age appropriate gift together with a thank you letter for the parents. Parents greatly appreciated the gifts, as communicated to the relevant research assistants. Once data had been collected from all the participants in the study a lottery took place in the research team's office, after which six randomly drawn families received an additional children's gift. All families received pictures of the lottery "happening" and a final thank you note.

Parent reporters were identified as Polish- or German-speaking. This was done on the basis of the language parents indicated they generally addressed to their 3.5-year-old, regardless of parental proficiency in the other language or detailed home language choice patterns as evidenced by responses to the BILTALK sub-questionnaire (section 3.2). In all BFLA families except one each parent spoke either Polish or German with 3.5-year-olds. One BFLA mother regularly spoke both languages

TABLE 3 Who filled out the BILTALK sub-questionnaire?

| | BFLA | ESLA | Total |
|---|---|---|---|
| 2 Polish-speakers | n.a. | 9 | 9 |
| 1 Polish-speaker and 1 German-speaker | 11 | n.a. | 11 |
| 1 Polish-speaker only | 3 | 5 | 8 |
| Number of children reported on | 14 | 14 | 28 |
| Minimum number of expected responses per BILTALK survey item (=number of parents who supplied data) | 25 | 23 | 48 |

n.a., not applicable.

with her son. She was identified as Polish-speaking because she was the only source of Polish input to her son within the family. In all ESLA families except one each parent spoke Polish with 3.5-year-olds. In the exceptional ESLA family both parents addressed their only child in both languages. Yet they had spoken only Polish to their child earlier. This is why they were both identified as Polish-speaking.

All BFLA Polish-speakers (13 mothers and one father) and all ESLA Polish-speakers (14 mothers) filled out the entire PEGEBOS-3 survey, including BILTALK. They did so in Polish. Nine ESLA Polish-speaking fathers and 11 BFLA German-speaking parents (10 fathers and one mother) completed only the BILTALK sub-questionnaire (Table 3). The Polish-speakers did so in Polish; the German-speakers in German. For BILTALK a total of 28 mothers and 20 fathers (11 BFLA, 9 ESLA) supplied data. Mothers filled it out first. Parents were asked to fill out BILTALK without consulting the other parent.

## 3. Analyses and results

Following the research questions (section 1.6), analyses were geared towards investigating differences and similarities between BFLA and ESLA children and their families on various measures. They started with an examination of children's reported language proficiency. Afterwards, the focus was on family language choice patterns.

### 3.1. Children's language proficiency

Six BILTALK items concerned children's language proficiency (see Appendix A for the items, response categories and ordering). Two queried language comprehension (one item per language). Four concerned production. Like in the parental questionnaire developed by Gagarina et al. (2010), parents were asked to evaluate their children's comprehension and production skills in each language on a Likert scale (see also Meir and Janssen, 2021).

#### 3.1.1. Comprehension

Parents were asked to what extent they agreed with items PR1 and PR3 in Appendix A (*cf.* When I talk to my child in Polish/German, (s)he often expresses misunderstanding of a word or phrase). As shown in Table 4, most parents who felt they could judge it entirely disagreed with these statements (29/38 responses for HL-Polish; 19/23 responses for SocL-German). Four BFLA and six ESLA children received the less favorable ratings *Not quite agree* or *More or less agree* by at least one parent for at least one language. On the whole, then, comprehension

TABLE 4 Comprehension misunderstandings: Number of parental responses per language.

| | BFLA | ESLA |
|---|---|---|
| **A.** HL-Polish | | |
| Completely agree | 0 | 1* |
| More or less agree | 1 | 0 |
| Not quite agree | 3 | 5 |
| Entirely disagree | 12 | 17 |
| Does not apply, I do not speak any Polish to my child | 9 | 0 |
| **B.** SocL-German | | |
| Completely agree | 0 | 0 |
| More or less agree | 0 | 1 |
| Not quite agree | 1 | 2 |
| Entirely disagree | 14 | 5 |
| Does not apply, I do not speak any German to my child | 10 | 11 |
| No response | 0 | 4 |

*This response by a Polish-speaking father must be in error, given that all other responses by this father point to quite fluent usage of HL-Polish by his child. It was treated as "No response."

issues were few and far between. There were no differences in parental responses between languages, $\chi^2(1, N=61)=0.338$, $p=0.561$, or between BFLA and ESLA parents, $\chi^2(1, N=61)=1.009$, $p=0.315$.

Focusing just on HL-Polish, one ESLA child received ratings by both parents that might be indicative of (light) problems with HL comprehension: Both parents gave a *Not quite agree* rating. Two additional ESLA children and one BFLA child received only maternal ratings on the comprehension statements (*Not quite agree*). For three other children (two BFLA, one ESLA) maternal *Not quite agree* ratings were set off by paternal *Entirely disagree* ratings. One BFLA girl received a rather bad maternal *More or less agree* rating (given that she was rated by her father as not having any comprehension issues in German, she is not to be seen as a "problem case" for comprehension development as a whole).

#### 3.1.2. Production

##### 3.1.2.1. Structural complexity

Two items (PR4 and PR6 in Appendix A) queried the complexity of language production, one for each language. While 3.5-year-olds are still fully in the process of acquiring language, they can normally already produce complex sentences and thus potentially show developmental differences between languages that will be clear to parents. Parents rated how often they had heard children say fairly complex sentences like three sample utterances in each language (Table 5). Parents used all five answer categories available to them (Appendix A), thus allowing distinctions between ratings (and hence children).

Parents were instructed not to pay attention to specific words and contents in the sample utterances, but to sentence structure. Utterances resembled those typically produced by Polish and German monolingual 3.5-year-olds, including some of their typical errors (see, respectively: Smoczyńska, 1985; Mills, 1985). Schneider (2012a, p. 63) reported similarly structured Polish and German utterances as said by her BFLA son in the fourth year of life.

A small pilot presented the sample utterances to Polish and German mothers in bilingual and monolingual families with

TABLE 5 Sample sentences in language complexity questions in BILTALK.

| Polish sample sentences | *English glosses* | German sample sentences | *English glosses* |
|---|---|---|---|
| a jak wiewiórka umrze, to gdzie idzie? | *and if the squirrel dies, where does it go?* | erst muss ich mich mal richtig hinlegen | *first I have to lie down properly* |
| ja najpierw muszę przyjść do pani | *I have to come to you first* | komm, wir wollen dies gerade spielen | *come on, let us play this right now* |
| daj mi te pieniążki, bo ja będę zapłacać | *give me the money, because I will pay you* | Mutti, ich hätte im Spiel Fieber, weil meine Stirne sind ganz heiss | *mommy, I would have a fever in the game because my foreheads are very hot* |

3.5-year-olds. Parents found them representative of 3.5-year-old speech. One would expect children to use them *frequently* or at least *regularly*. Children who *sometimes*, *hardly*, or *never* used them were comparatively not as highly developed. In a bilingual setting, well developed use in at least one language is sufficient to dismiss the possibility of an overall language learning delay (e.g., De Houwer, 2018b).

A first focus was on the extent to which children were rated as using complex structures in any language. The separate answers for each language were thus compared and the best score in any language tallied (Table 6, A).

Most (13/14) BFLA children were rated by at least one parent as having an expected speaking ability (answers *frequently* and *regularly*) in at least one language. One girl's best score in either language was that she only *sometimes* used the level of complexity in the sample utterances. Unfortunately data from the girl's German-speaking father for a second opinion were lacking. All except perhaps one of the BFLA children, then, were *frequently* or *regularly* producing the kinds of complex structures expected for 3.5-year-olds in least one language.

The distribution amongst the best scores by any parent in either language for the ESLA children is virtually identical to those for the BFLA children (Table 6, A). For one ESLA girl both parents agreed she only *sometimes* used complex Polish structures. Parents had not heard her use any complex German structures (as later emerged from the language choice data, their daughter did speak some German with them, though). The mother who was single stated she had *hardly* ever heard her ESLA daughter use Polish complex structures and had *never* heard her child use complex German structures (her daughter only spoke Polish with her). Information from persons more familiar with these two ESLA children's use of German would be needed to assess their overall level of language development. Much like the BFLA children, then, all except perhaps two ESLA children were *frequently* or *regularly* producing the kinds of complex structures expected for 3.5-year-olds in at least one language.

Summarizing, in at least one language, most bilingual preschoolers were able to use complex structures as expected for their age. For three of the less well performing children (1 BFLA, 2 ESLA) additional SocL-German ratings would be required to assess whether they were perhaps slightly delayed in their overall language development. BFLA-ESLA differences did not emerge.

Having established that at least 25 out of 28 bilinguals were producing complex sentences at a level expected for their age, the analysis now turns to complexity in the HL. For this it considers

TABLE 6 Language complexity ratings.

| | BFLA | ESLA |
|---|---|---|
| **A**. Overall complexity: Best score by any parent in either language per child * | | |
| Frequently | 9 | 9 |
| Regularly | 4 | 3 |
| Sometimes | 1 | 1 |
| Hardly | 0 | 1 |
| **B**. HL complexity: Ratings by Polish-speakers (27 mothers, one father) for 14 BFLA and 14 ESLA children | | |
| Frequently | 5 | 8 |
| Regularly | 5 | 4 |
| Sometimes | 2 | 1 |
| Hardly | 2 | 1 |
| **C**. Comparison of parental complexity ratings (possible for 23 BFLA and 10 ESLA parents) | | |
| Same complexity rating in both languages | 12 | 3 |
| Higher complexity rating for HL-Polish | 4 | 6 |
| Higher complexity rating for SocL-German | 7 | 1 |
| **D**. Cross-linguistic comparison of parental complexity ratings per child ** | | |
| Same complexity rating in both languages | 5 | 1 |
| Higher complexity rating for HL-Polish | 3 | 5 |
| Higher complexity rating for SocL-German | 6 | 1 |

*Two BFLA German-speaking fathers did not answer the question about Polish complexity (one father did not speak Polish, the other one hardly so); most (13/23) ESLA parents stated they had not heard children use any complex German sentences. Ten of these parents were hardly fluent in German.

**Cross-linguistic comparative complexity ratings were available for all 14 BFLA children. Comparative complexity ratings were available for only 7 ESLA children because for the others no parent had supplied a German rating.

responses by Polish-speaking mothers only (Table 6, B). This is because mothers worked outside the home far less than fathers (section 2.2) and thus had more opportunity to hear children talk. Paternal rather than maternal ratings for the BFLA family where the father was the Polish-speaker were also included. No BFLA-ESLA differences emerged, $\chi^2(1, N = 28) = 0.849$, $p = 0.357$.

There was little overall variation amongst children in HL-Polish complexity ratings (Table 6, B). All the more noticeable were the five children (BFLA: 3, ESLA; 2) who did not receive a favorable rating (*sometimes* or *hardly* complex HL structures) from any Polish speaker (not just mothers). In a detailed visual inspection of the raw data, several factors were explored as possible explanations: whether children had older siblings (and perhaps heard more German from them than Polish), whether they had younger siblings (Polish-speakers with infants may have had less time to speak with 3.5-year-olds, offering children less HL input), or whether mothers worked outside the home. For the five more poorly performing children there was a great deal of variation in all these factors, rendering it impossible to discern any patterns.

Finally, for all children it was investigated whether family trips to Poland were associated with HL complexity (complexity ratings *frequently/often* vs. *sometimes/hardly* in function of whether the family had taken any trips to Poland since children's third birthdays or not). No such link emerged, $\chi^2(1, N = 28) = 0.020$, $p = 0.887$.

The two questions about structural complexity within each language did not directly ask parents to compare across languages. Yet

it was possible to compare the structural complexity ratings cross-linguistically for parents who had supplied ratings for each language (23 BFLA and 10 ESLA). As shown in Table 6, C, more than half the BFLA parents but only three ESLA parents indicated the same frequency of use of structural complexity across languages (e.g., the rating *often* for each language). Four BFLA and six ESLA parents gave higher structural complexity ratings for HL-Polish than SocL-German (e.g., *frequently* vs. *often*, or *often* vs. *sometimes*). Seven BFLA parents but only one ESLA parent gave higher ratings for SocL-German than HL-Polish (idem). Thus, the picture for ESLA differed from the one for BFLA, $\chi^2(2, N=33)=6.130$, $p=0.046$: most ESLA parents rated children as more frequently producing complex HL-Polish than SocL-German structures, while most BFLA parents gave similar ratings in each language or rated children as more frequently producing complex SocL-German than HL-Polish structures.

The 23 BFLA parents who supplied structural complexity ratings for each language were parents to a total of 14 BFLA children. The 10 ESLA parents who supplied structural complexity ratings for each language were parents to a total of seven ESLA children. Focusing on the level of the children and abstracting away from double ratings for the same child[8], it turns out that most of these ESLA children (five out of seven) but only three BFLA children received a higher complexity rating for HL-Polish (Table 6, D). On the other hand, nearly half (6/14) of the BFLA children had a higher complexity rating for SocL-German. This was the case for only a single ESLA child. There was one BFLA girl whose two parents agreed she often produced German complex structures but none in Polish (in separate communication, the mother commented that the girl had low HL-Polish speaking skills; she also had a bad score for HL-Polish comprehension). Five BFLA children but only a single ESLA child had the same complexity rating in both languages.

In summary, this section analyzed ratings of how often parents heard 3.5-year-olds produce the sort of complex structures expected for their age. Abstracting from a particular language, most children *frequently* or *regularly* produced complex structures and were thus developing language as expected. Maternal ratings for HL-Polish showed little variation amongst children. No BFLA-ESLA differences emerged here. Cross-linguistic comparisons both at the level of parental ratings and the level of children, however, did reveal a BFLA-ESLA difference: Most BFLA children's use of complex utterances was rated similarly in both languages or higher in the SocL, whereas most ESLA children's use of complex utterances was rated higher in the HL (with the caveat that comparisons at the child level were possible for only half the ESLA sample).

#### 3.1.2.2. Relative proficiency ratings: Parental comparative assessment of which language was better developed

The final proficiency questions asked parents explicitly (1) whether children spoke German better than Polish, and (2) whether children spoke Polish better than German (PR2 and PR5 in Appendix A). The question was asked in both directions in order to avoid skewed responses. Each two responses per parent were coded in terms of whether the responses were the same (indicating no difference between languages) or not. For differing responses that involved just *more or less agree* and *not quite agree* the language receiving *more or less agree* was coded as being better. Differing responses including at least one rating on the extreme were very clear as to which language was considered better and needed no additional coding. In no case were a parent's answers for each language separately contradictory. All parents who had filled in BILTALK except one ESLA father answered both questions (this father only answered the question as to whether the child spoke better Polish than German). The two BFLA German-speaking fathers who had not answered the complexity questions (section 3.1.2.1) did answer these.

Table 7 lists the results according to individual responses by Polish-speakers and German-speakers as well as according to responses by a parent pair, where applicable. Two thirds of BFLA parents but none of the ESLA parents indicated there was no difference between languages. Ten BFLA parents identified SocL-German as the stronger language. Only one ESLA parent did. No BFLA parent claimed that their child spoke HL-Polish better than SocL-German. In contrast, all except one ESLA parent did. Differences between BFLA and ESLA for individual parental responses were statistically highly significant, $\chi^2(2, N=49)=35.753$, $p<0.001$[9].

Combining both BFLA parents' ratings largely confirmed the individual response picture, although in four BFLA cases parents disagreed with each other, with Polish-speakers hearing no difference between languages, whereas German-speakers considered SocL-German better developed. All nine ESLA parent pairs agreed that HL-Polish was better developed.

Parental relative proficiency ratings showed a clear BFLA-ESLA difference. BFLA parents mainly indicated no difference between languages or higher proficiency in SocL-German. ESLA parents mainly indicated higher proficiency in HL-Polish. This result confirms tendencies earlier found for structural complexity. The following analysis combines structural complexity and relative proficiency ratings.

#### 3.1.2.3. Relative complexity and relative proficiency ratings combined

In a final analysis for proficiency comparative ratings for structural complexity and relative proficiency were combined (Table 8). This allowed for the tentative identification of different child proficiency profiles (tentative, because for 7 ESLA children there were no parental ratings for SocL complexity).

Child proficiency profiles showed a difference amongst BFLA and ESLA children. Five BFLA but no ESLA children showed similar performance in both languages. More BFLA than ESLA children tended towards greater SocL-German proficiency, and more ESLA than BFLA children tended towards greater HL-Polish proficiency, $\chi^2(1, N=22)=14.20$, $p<0.001$. For one BFLA child it was impossible to decide on a proficiency profile because of contradictory parental ratings.

8 For the 20 children whose two parents supplied a structural complexity rating the best rating was listed in Table 6, D (e.g., if father gave a higher frequency rating for one language compared to the other, and mother gave similar ratings, regardless of the level, father's higher frequency rating was counted). For seven children there was no difference amongst maternal and paternal ratings; for six children fathers gave higher ratings, and for seven children mothers gave higher frequency ratings.

9 Because two cells in the contingency table equaled zero their values had to be raised to 1 for statistical treatment. The actual *N* was 47.

TABLE 7 Which language did children speak best?

| | According to... | | |
|---|---|---|---|
| BFLA | Polish-speakers *N*=14 | German-speakers *N*=11 | Parent pair *N*=11 |
| HL-Polish | 0 | 0 | 0 |
| No difference | 10 | 5 | 4 |
| SocL-German | 4 | 6 | 3 |
| Parents disagreed | n.a. | n.a. | 4 |
| ESLA | Polish-speakers *N*=22 | German-speakers *N*=0 | Parent pair *N*=9 |
| HL-Polish | 21 | n.a. | 9 |
| No difference | 0 | n.a. | 0 |
| SocL-German | 1 | n.a. | 0 |
| Parents disagreed | n.a. | n.a. | 0 |

n.a., not applicable.

Combined findings for structural complexity and relative proficiency showed a clear difference between BFLA and ESLA children. BFLA children's proficiency was generally the same across languages or better in SocL-German; ESLA children's proficiency was better in HL-Polish.

### 3.1.3. Comprehension and production compared

One may wonder whether there was any relation between comprehension (section 3.1.1) and production in terms of the language proficiency profiles in Table 8. Of the 10 children who occasionally misunderstood one or both their languages four showed less good comprehension in the language they spoke less well: Two BFLA children who occasionally misunderstood Polish spoke better German than Polish; likewise, but in the other sense, two ESLA children who occasionally misunderstood German spoke better Polish than German. This is what one might expect. Yet four ESLA children who occasionally misunderstood Polish spoke better Polish than German. One BFLA child who occasionally misunderstood Polish showed no difference between languages in production. An additional BFLA child who occasionally misunderstood either language spoke better German, and an ESLA child who did so spoke better Polish.

These variable results do not support any language balance link between comprehension and production.

## 3.2. Language choice patterns

This section examines language choice patterns amongst 3.5-year-olds and their parents. These patterns were queried through open ended overall questions in PEGEBOS-3 (listed in Appendix B) and detailed language choice questions in BILTALK (see Appendix D for the specific items and response categories). The same parents (25 BFLA and 23 ESLA, section 2.4) who filled in BILTALK items about child language proficiency responded to detailed language choice questions. A number of discrepancies arose amongst responses to overall and detailed questions. Before turning to those brief analyses are presented of language choice patterns that were only queried in PEGEBOS-3, *viz.*, children's language choice with siblings and self, language choice within the parent pair, and family language choice patterns outside the home. Overall language choice patterns had reportedly not changed since children's third birthdays.

TABLE 8 Relative complexity and relative overall proficiency ratings combined (child level) *.

| | BFLA | ESLA |
|---|---|---|
| **A.** Child proficiency profile: Similar performance in each language | | |
| No cross-linguistic difference for both complexity and proficiency | 5 | 0 |
| **B.** Child proficiency profile: Tendency towards greater HL proficiency | | |
| Higher HL complexity and proficiency | 0 | 5 |
| Higher HL complexity but cross-linguistically similar proficiency | 1 | 0 |
| No cross-linguistic difference for complexity but greater HL proficiency | 0 | 2 |
| Comparative complexity unknown but greater HL proficiency | 0 | 6 |
| Total | 1 | 13 |
| **C.** Child proficiency profile: Tendency towards greater SocL proficiency | | |
| Higher SocL complexity and proficiency | 2 | 0 |
| Higher SocL complexity but cross-linguistically similar proficiency | 3 | 0 |
| No cross-linguistic difference for complexity but greater SocL proficiency | 2 | 0 |
| Comparative complexity unknown but greater SocL proficiency | 0 | 1 |
| Total | 7 | 1 |
| **D.** Child proficiency profile unclear | | |
| Higher HL complexity but greater SocL proficiency | 1 | 0 |

*Full ratings were available for all 14 BFLA children. Comparative complexity ratings were available for only 7 ESLA children because for the others no parent had supplied a German rating.

### 3.2.1. Children's language choice with siblings and self

Children's language choice with siblings and self was queried through overall questions in PEGEBOS-3 (Appendix B). Both BFLA and ESLA children mostly spoke both languages with siblings (Table 9). If only a single language was used, it was HL-Polish. Likewise, in speech to self both BFLA and ESLA children used both languages. If only a single language was used, it was HL-Polish for ESLA children and SocL German for BFLA children.

### 3.2.2. Language choice within the parent pair

Parents' language choice amongst each other was queried through overall questions in PEGEBOS-3 (Appendix B). BFLA families presented a variable picture in terms of language choice amongst mothers and fathers. Eight parent pairs spoke SocL-German with each other, one used HL-Polish. Four parent pairs used both languages (one of these also used English), and in the final family parents addressed each other in English. In contrast, not counting the ESLA single parent family, 20 ESLA parents in 10 families spoke only HL-Polish with each

TABLE 9 Children's language choice with siblings and to self.

| | BFLA | ESLA |
|---|---|---|
| **A**. Languages(s) target children speak with siblings * | | |
| HL | 2 | 6 |
| Both HL and SocL | 7 | 7 |
| SocL | 0 | 0 |
| **B**. Languages(s) target children speak to themselves | | |
| HL | 0 | 3 |
| Both HL and SocL | 12 | 11 |
| SocL | 2 | 0 |

*4 BFLA and 1 ESLA child were single children; 1 BFLA child had a younger baby sibling but was not speaking to the one-month-old yet. These children are not tallied here.

other. Three ESLA parents spoke both HL-Polish and SocL-German with their spouse (who in turn spoke just HL-Polish back; missing data for one parent).

### 3.2.3. Overall language choice amongst family members in public

PEGEBOS-3 also asked to indicate which language(s) 3.5-year-olds and their parents spoke amongst themselves in five public settings (Appendix C). BFLA families were more likely to speak SocL-German outside the home than ESLA families, who mostly tended to use only HL-Polish (Table 10). Both family types did speak both languages outside the home as well, but ESLA families were far less likely than BFLA families to do so, $\chi^2(2, N=84)=33.086$, $p<0.001$[10].

### 3.2.4. Parental language choice in interaction with target children

Table 11, A shows parental responses to overall parental language choice with their three-year-olds (based on PEGEBOS-3; Appendix A). A clear BFLA-ESLA difference emerged, with most BFLA children hearing the HL from one parent and the SocL from the other (pattern iv, see section 1.3), and most ESLA children hearing only the HL from both parents (pattern i, see section 1.3).

It was mothers who supplied overall parental language choice data, both for their own language choice and that of children's fathers. Table 11, B shows results tallying maternal and paternal responses for parental language choice based on BILTALK (Appendix D). It also separately lists BILTALK data from eight mothers in the absence of paternal BILTALK data. Three of these mothers (all ESLA) earlier had stated they only spoke the HL to children but now indicated they spoke both the HL and SocL to them. Assuming that the language choice data they and the other five mothers had given for fathers was in fact correct, their data were absorbed in Table 11, C, yielding a picture that differs from the one in Table 11, A.

Seven ESLA children heard the HL from both parents and in addition the SocL from one parent (pattern ii, see section 1.3), a possibility that did not emerge according to overall language choice patterns. A clear BFLA-ESLA difference remained, though, with language choice patterns (iv) and (v) limited to BFLA families, and patterns (i) and (ii) limited to ESLA families. Instead of 13 "one parent, one language" BFLA families, however, there now appeared to be only 10. That shift was not quite as large, however, as the one for ESLA families, where instead of 13 families with both parents speaking only the HL to children (pattern i) there were in fact only five.

TABLE 10 Family language choice outside the home across five settings.

| | BFLA | ESLA |
|---|---|---|
| Only or mostly HL-Polish | 3 | 27 |
| Mostly or only both languages | 26 | 14 |
| Only or mostly SocL-German | 13 | 0 |

The basis for these numbers consists of frequency codes attributed to each speaker (28 children, 27 fathers, 28 mothers = 83 in total) across the five settings queried in Appendix B.

TABLE 11 Parental language choice with target children *.

| | BFLA | ESLA |
|---|---|---|
| **A**. Parental language choice according to PEGEBOS-3 | | |
| (i) Both parents just the HL | 0 | 13 |
| (iii) Both parents both languages | 0 | 1 |
| (iv) One parent the HL, the other parent the SocL | 13 | 0 |
| (v) Both parents the SocL, one parent the HL | 1 | 0 |
| **B**. Parental language choice according to BILTALK: Detail | | |
| Both parents just the HL | 0 | 4 |
| Both parents the HL and one parent the SocL | 0 | 3 |
| Both parents both languages | 1 | 2 |
| One parent the HL, the other parent the SocL | 7 | 0 |
| Both parents the SocL, one parent the HL | 3 | 0 |
| BILTALK data only for mother: Speaks the HL (same information as in PEGEBOS-3) | 3 | 1 |
| BILTALK data only for mother: Speaks both the HL and the SocL (information differs from the one in PEGEBOS-3) | 0 | 3 |
| BILTALK data only for mother: Speaks both the HL and the SocL (same information as in PEGEBOS-3) | 0 | 1 |
| **C**. Parental language choice according to BILTALK: Sole maternal BILTALK data absorbed | | |
| (i) Both parents just the HL | 0 | 5 |
| (ii) Both parents the HL and one parent the SocL | 0 | 7 |
| (iii) Both parents both languages | 1 | 2 |
| (iv) One parent the HL, the other parent the SocL | 10 | 0 |
| (v) Both parents the SocL, one parent the HL | 3 | 0 |

*Language choice pattern numbers refer to the ones outlined in section 1.3 earlier.

### 3.2.5. Children's language choice in interaction with their parents

Table 12, A shows parental responses to overall children's language choice with their parents (based on PEGEBOS-3; Appendix B). A clear BFLA-ESLA difference emerged, with most BFLA children speaking

10 Because one cell in Table 10 equaled zero its value had to be raised to 1 for statistical treatment.

the HL to one parent and the SocL to the other (pattern civ), and most ESLA children speaking only the HL to both parents (pattern ci).

Mothers had supplied overall children's language choice data, both for children addressing them and their fathers. Table 12, B shows results tallying maternal and paternal responses for children's language choice based on BILTALK (Appendix D). It also separately lists BILTALK data from seven mothers in the absence of paternal BILTALK data. Three of these mothers (all ESLA) earlier had stated children only spoke the HL to them but now indicated that children spoke both languages to them. Assuming that the language choice data they and three BFLA mothers had given for children's language choice with fathers was in fact correct, their data were absorbed in Table 12, C (maternal BILTALK data for an additional ESLA mother were uninterpretable because of contradictory information), yielding a picture that differs from the one in Table 12, A.

Seven ESLA children spoke the HL to both parents and in addition the SocL to one parent (pattern cii), whereas according to overall language choice responses there was only one. A concomitant change was that far fewer (four instead of 11) ESLA children spoke just the HL to parents (ci). A clear BFLA-ESLA difference remained, with BFLA children showing two patterns (civ: HL to one parent, SocL to the other; cv: SocL with one parent, both languages with the other) that were not used by ESLA children, and ESLA children showing two patterns (ci: only HL; cii: HL with one parent, both languages with the other) that were not used by BFLA children. There were also three BFLA children who spoke both languages with both parents (pattern ciii), indicating increased use of the HL compared to the overall responses.

TABLE 12 Children's language choice with parents *.

| | BFLA | ESLA |
|---|---|---|
| **A**. Child language choice according to PEGEBOS-3 | | |
| (ci) Only HL with both parents ** | 0 | 11 |
| (cii) HL with one parent, both languages with the other | 0 | 1 |
| (ciii) Both languages with both parents | 0 | 2 |
| (civ) HL with one parent, SocL with the other | 9 | 0 |
| (cv) SocL with one parent, both languages with the other | 5 | 0 |
| **B**. Child language choice according to BILTALK: Detail | | |
| (ci) Only HL with both parents ** | 0 | 4 |
| (cii) HL with one parent, both languages with the other | 0 | 4 |
| (ciii) Both languages with both parents | 3 | 2 |
| (civ) HL with one parent, SocL with the other | 5 | 0 |
| (cv) SocL with one parent, both languages with the other | 3 | 0 |
| BILTALK data only from mother: Child speaks HL to her (same information as in PEGEBOS-3) | 3 | 0 |
| BILTALK data only from mother: Child speaks both languages to her (different information from PEGEBOS-3) | 0 | 3 |
| BILTALK data only from mother: Uninterpretable | 0 | 1 |
| **C**. Child language choice according to BILTALK: Sole maternal BILTALK data absorbed | | |
| (ci) Only HL with both parents ** | 0 | 4 |
| (cii) HL with one parent, both languages with the other | 0 | 7 |
| (ciii) Both languages with both parents | 3 | 2 |
| (civ) HL with one parent, SocL with the other | 8 | 0 |
| (cv) SocL with one parent, both languages with the other | 3 | 0 |

*Child language choice patterns numbered to mirror parental language choice patterns numbers (Table 11).
**Or single parent, in one ESLA case.

### 3.2.6. Summary: Language choice findings

This section analyzed patterns of language choice from different perspectives, with a main focus on 3.5-year-olds. Children's interactions with siblings and in speech to self mainly took place in both languages, regardless of whether children were growing up in a BFLA or ESLA setting. In speaking to their parents, 10 children used both languages with one parent, but only HL-Polish (seven ESLA children) or SocL German (three BFLA children) with the other. Five children spoke both languages to both parents. Twelve children exclusively used a single language with either of their parents. For eight BFLA children this single language was a different one for each parent. Considered from the perspective of individual parents, 23/54[11] (0.43) were exclusively addressed in HL-Polish by their preschooler, 11/54 (0.20) in SocL-German, and 20/54 (0.37) were addressed in both languages. On the whole, then, interactional settings involving the HL (0.43 + 0.37) were more frequent than those involving the SocL (0.20). There were BFLA-ESLA differences here, however, with exclusive SocL usage with any parent limited to BFLA children. If ESLA children used the SocL with a parent, they were also using the HL with that same parent.

In many ways, children mirrored their parents' language choice with them. Most parents (27/56, or a proportion of 0.48) addressed children in only the HL. Nearly a third (16/56; 0.29) used both languages with children (5 BFLA; 11 ESLA), and not even a quarter (13/56; 0.23) used only the SocL. Again, there were BFLA-ESLA differences here, with exclusive SocL usage to children by parents limited to BFLA families. With one exception families where both parents used the HL with children (regardless of whether they also spoke the SocL) were ESLA families.

The summary above for language choice amongst preschoolers and parents is based on responses to detailed language choice questions. These were often different from responses to overall language choice questions. As discussed further below, in case of internal inconsistencies amongst responses to overall versus detailed questions it is likely better to see the latter as more valid than the former. In addition, detailed language choice questions were often answered by two rather than just a single parent, thus increasing reliability as well.

Finally, family language choice outside the home was quite different for BFLA and ESLA families and reflected home language choice patterns amongst preschoolers and parents. The frequent use of two languages in the home was extended outside the home in BFLA families, whereas ESLA families tended to stick much more to just HL-Polish, in line with home language use. Use

11 The 28 children had 56 parents but in one case there was no contact with the father and in another case child language choice data were contradictory.

of just SocL-German outside the home only occurred in BFLA families.

## 4. Discussion and conclusion

This study sought to investigate whether young preschoolers with exposure to a heritage language (HL) from birth showed different patterns of HL development depending on whether they had in addition been exposed to another language from birth as well (RQ1). To this end the study compared HL development and use by two kinds of bilingual preschoolers: children who had heard two languages from birth in the home (Bilingual First Language Acquisition, BFLA) or children who had started off first hearing a single language at home and later added a second language through childcare or preschool (Early Second Language Acquisition, ESLA).

The HL in this study was Polish, and children were acquiring German as a societal language (SocL) either through home exposure from birth or through preschool. This specific focus on HL-Polish and SocL-German served to address RQ2. It fills a substantive gap in research on early HL-Polish development, not only in a German-speaking country, but also elsewhere: with the exception of Miękisz et al.'s (2017) study of toddlers, group studies on early HL-Polish development so far have focused on older preschoolers (e.g., Kulik, 2016; Haman et al., 2017; Mieszkowska et al., 2017; Abbot-Smith et al., 2018; Hansen et al., 2019).

Other than the BFLA-ESLA difference target children in this study were demographically comparable. Children were nearly all 3.5 years old. Gender distribution across BFLA-ESLA groups was similar. All children except one grew up in a dual parent family. All children except two grew up with at least one highly educated parent. If mothers worked outside the home, it was mainly part-time. Most fathers worked full-time outside the home. There were no BFLA-ESLA differences in parental ages. All Polish-speaking parents were born in Poland and had emigrated to the German-speaking country children lived in at the time of data collection. Most children were born in that same country. Being similarly aged, children had heard HL-Polish from at least one parent for the same length of time, i.e., from birth. They had the same experience in German-speaking preschool and were attending preschool by age three.

Data collected through a detailed online survey filled out by 28 mothers and 20 fathers revealed similarities but also important differences amongst BFLA and ESLA children (and their families).

Most children had no problems with comprehension in either language. In at least one language all except perhaps three children were saying complex utterances of the type generally expected for their age. No BFLA-ESLA differences emerged.

Most children regularly or frequently used complex HL-Polish utterances. This result is better than the one for 12 older Polish-German preschoolers (Kulik, 2016, p. 111). As Reich (2009) noted, four-year-olds may already start to stagnate in the HL. The present study did find one BFLA and two ESLA 3.5-year-olds who hardly used any HL-Polish complex structures. Whether HL stagnation was at work here will be examined in a future study comparing children's performance on parent report data collected 9 months earlier. At any rate, contrary to findings by others (Slavkov, 2015), trips to the country where the HL is a SocL did not seem to have affected children's HL proficiency.

When structural complexity ratings were compared across languages, BFLA-ESLA differences emerged, with BFLA children mostly not showing any difference between languages or doing better in SocL-German and ESLA children mostly doing better in HL-Polish. Additional parental ratings of which language they thought their child spoke better overall confirmed these differences. When these findings for relative overall proficiency were combined with those for structural complexity in one versus the other language the picture became even clearer: BFLA children's proficiency was the same across languages or better in SocL-German; ESLA children's proficiency was better in HL-Polish.

The finding of BFLA-ESLA relative proficiency differences already at age 3.5 shows the importance of taking into account that children's exposure to the SocL from birth may lead to different HL trajectories than if exposure to the SocL started some time after birth. Studies of HL development in preschoolers that tally the age at which children first started being regularly exposed to the SocL often do not have a separate category for children who started such exposure at birth, thus potentially obscuring important differences amongst children: For instance, in their study of HL-Russian as used by 3.5- to 8-year-olds Gagarina and Klassert (2018) distinguished between children who were below 18 months, between 18 months and 3;05 years, or between 3;06 and 5;05 years old when they first came into regular contact with SocL-German; there was no separate category for children who started hearing SocL-German from birth.

These findings for preschoolers foreshadow differential findings for BFLA and (E)SLA primary school children with regard to HL use in the home: (E)SLA primary school children stand a far greater chance of speaking the HL than BFLA peers (see the Introduction). If BFLA preschoolers' level in the SocL is better they are bound to want to use it more. The more they speak it, the higher their SocL proficiency will be. In contrast, bilingual children's lesser use of a language may lead to declining proficiency in it (Ribot et al., 2018), and, ultimately, to children no longer speaking one of their languages (De Houwer, 2009).

Children's use of a particular language forms part of their language choice patterns, that is, like all bilinguals, children always have to select one particular language when they speak, or use a mixed utterance combining material from both languages (De Houwer, 2019b). Recurrent language choice patterns with particular interlocutors lead to potentially highly unbalanced frequencies of use of a particular language. Thus it is important to gain reliable information about language choice patterns, not only those of children, but also those of parents, who, aside from staff and peers in group settings such as preschool, are children's main providers of language input from and through which children acquire their languages.

This study used different ways of querying language choice patterns. Some discrepancies between general and detailed questions about language choice were to be expected (section 1.5). Furthermore, the addition of information sources by having data supplied by both parents for 20 of the 28 families was also expected to lead to discrepancies with information provided by a single person. However, the magnitude of the discrepancies between answers by a single parent (mothers) about their and family members' overall language choice and parental answers by each parent on detailed questions regarding their own language choice and that of their children in interaction with them was not expected. Especially for ESLA families

discrepancies were surprisingly large. Compared to overall information, many more ESLA parents and children spoke both languages with each other rather than solely HL-Polish. Parental questionnaires about bilingual children do not usually highlight the respondents (e.g., the in-depth review by Kašćelan et al., 2022, does not mention anything about who filled out questionnaires except that "the information tends to be obtained from parents/caregivers, teachers, and to a lesser extent from the children themselves", p. 29), and do not normally contain items querying the same information in different ways. Researchers should be aware that general information supplied by a single parent may not reflect actual practice. One can assume that answers to more detailed questions by more than a single respondent, as done in this study by involving both members of a parent pair, give a more accurate and reliable picture.

In the present study, BFLA mothers mostly espoused a "one parent, one language" setting as far as overall parental language choice with preschoolers was concerned, and indicated that children followed a parent's language choice or spoke SocL-German with one parent and both languages with the other. This picture was more or less confirmed by the detailed information, although that information showed a few more parents and children using both languages with each other rather than just a single one. In contrast, ESLA mothers mostly presented their family as speaking exclusively HL-Polish but in as many as half of ESLA families detailed information showed parents speaking both languages to children. In only half of ESLA families was the information for children's language choice the same across overall and detailed information. The larger discrepancies for ESLA families on the one hand and the smaller discrepancies for BFLA families on the other can perhaps be explained by different life circumstances of mothers in each type of family. Mothers in BFLA families have been part of a bilingual family since their child was born and were perhaps more aware of linguistic choices from the very start and much more focused on language use than mothers in ESLA families. Hence they were able to give general language choice information that was much closer to actual practices. One could also imagine that being part of a fully Polish origin family rather than a transnational family in the case of BFLA mothers supported ESLA mothers' sense that only HL-Polish was part of family life, and that it was only when they were asked to reflect on detailed practices that they considered actual reality, which included much more home SocL use than was reported in a general fashion (in their study of HL-Polish-speaking families with ESLA toddlers in the UK using detailed language choice questions Miękisz et al., 2017 found that SocL-English use at home was not uncommon).

Children's language choice patterns were quite distinct for BFLA and ESLA families. BFLA children used HL-Polish in fewer interactional settings with parents than did ESLA children. ESLA children spoke HL-Polish with both parents. Those BFLA children who did so also spoke SocL-German with both parents and thus divided up the time between languages. Several ESLA children spoke both languages with one parent as well but still spoke HL-Polish only with the other parent. Most BFLA, but not ESLA, children exclusively spoke SocL-German with at least one parent. Although these language choice patterns do not say anything with regard to actual frequency of use, they are quite different, and are a direct result of children growing up within very different home language environments. ESLA children's more varied use of HL-Polish in the family compared to BFLA children may help explain the fact that they were more proficient in HL-Polish than SocL-German compared to BFLA children.

The fact that BFLA and ESLA children's home language environments were in fact quite distinct is clear from the detailed parental language choice data for their interactions with preschoolers. No ESLA parent spoke only SocL-German with children, but many BFLA parents did. Double as many ESLA than BFLA parents spoke both languages with children: More so than ESLA parents, BFLA parents stuck to a single language with children. The fact that all ESLA children heard HL-Polish from both parents and most BFLA children only from a single parent suggests that exposure to HL-Polish was generally more varied in the ESLA families and could help explain ESLA children's higher HL-Polish proficiency, in addition to the fact that ESLA children themselves spoke HL-Polish in more interactional settings (*cf.* above). Some authors assume that children growing up with just the HL at home hear more of it at home than families growing up with both the HL and the SocL at home (*cf.* Rodina and Westergaard, 2017; Rodina et al., 2020; see also Flores et al., 2017, who assume that "children who are growing up in Portuguese–German households have significantly less exposure to their HL than children whose HL is the dominant language spoken at home, even though both groups are exposed to Portuguese from birth," p. 809). However, findings about parental language choice do not say anything about the absolute frequency of parental input in each language, nor about the proportion of use of each language. It is an empirical question as to whether there is a default difference in the frequency of home HL exposure in bilingual rather than monolingual HL-speaking families. Children growing up in BFLA versus ESLA families do have a very different language ecological experience with each language (De Houwer, 2018b, 2021). For instance, for BFLA but not ESLA children large linguistic variation in the input is present from the outset, and BFLA but not ESLA children have been used to people speaking in fundamentally different ways from birth. BFLA but not ESLA children have learned to understand words and expressions in both languages from early infancy onwards, and BFLA but not ESLA children's early language production usually is distributed over two languages. BFLA families have emotional and cultural connections with two languages and personal connections with speakers of each; this is quite different for ESLA families, whose connections are mainly tied to a single language. All this helps explain why by age 3.5 this study already found differences between BFLA and ESLA children's development and use of the heritage language.

A question not usually asked in studies of young bilinguals is which language(s) children speak to themselves (see Sawyer, 2016, for a review of the few studies investigating bilingual children's private speech). In the current study bilingual preschoolers overwhelmingly used both their languages in private speech. This finding merits further exploration. For instance, it would be interesting to know whether different private speech functions are associated with a different language, or whether the self-regulatory functions associated with private speech are used regardless of language.

In addition to the general question about children's language choice with themselves there were general questions about children's language choice with siblings, language choice amongst parents, and family language use outside the home. Answers to these questions are presumably less likely to have personal feelings of identity and investment attached to them than questions regarding parental language choice with children and children's language choice with

parents. Therefore they are likely quite reliable. Especially the question about language use outside the home was quite complex and required nuanced and focused answers, much like the detailed language choice questions. Also, it is unlikely that parents have fixed ideas about what language(s) they should be using outside the home. It was striking that the BFLA-ESLA input difference as obtained through detailed language choice questions was reflected in family language practices outside the home, thus reinforcing BFLA children's greater use of and exposure to SocL-German, and ESLA children's greater use of and exposure to HL-Polish.

A final point relates to the method used to gain information about children's HL proficiency. Resources did not allow the collection of observational data as would be possible through the use of the MAIN approach, for instance (MAIN: Multilingual Assessment Instrument for Narratives, first described in Gagarina et al., 2012), which has been standardized both for Polish and German (in addition to many other languages). Standardized parental questionnaires to help assess language proficiency exist, but are only usable with children until the end of the third year (Polish: Smoczyńska, 1999/2015; German: Szagun et al., 2009). In the same spirit as those parental questionnaires it was decided to include six survey questions to gain an idea of children's language proficiency. The fact that the answers yielded fairly consistent results can be seen as a validation of the basic method. Abbot-Smith et al. (2018) showed for 20 even older Polish-English bilinguals (five-year-olds) that parental reports on child language proficiency matched results from laboratory-based tests, and thus were reliable sources of information. However, for better reliability it would be best to include additional questions.

The reliability of the parental reports in the present study was likely enhanced by including both maternal and paternal ratings of child proficiency, a fairly unique method compared to most studies of bilingual preschoolers (but see Lundén and Silvén, 2011; Byers-Heinlein and Werker, 2013; De Houwer et al., 2014). This gave a fuller picture of children's language development than could have been obtained solely on the basis of maternal report. Some of the results confirmed that in order to properly evaluate whether bilingual children are overall developing language as expected it is useful to have both parent reports (see also De Houwer, 2019a): As regards structural complexity, a less favorable report by one parent for one of the languages was sometimes offset by a more favorable report by the other parent for the other language. This was true both for BFLA and ESLA children. Although there were some minor differences amongst parental ratings in the same family, parents mostly agreed with each other, in spite of sometimes large differences between mothers' and fathers' levels of Polish and German proficiency in the BFLA and ESLA families, respectively.

In spite of the rich data gathered through involving both mothers and fathers in data collection, both the relatively small number of children reported on in each group and the large similarity amongst children on several measures resulted in only suggestive results regarding links between children's relative language proficiency levels on the one hand, and child language choice on the other. Also, the current analyses focused on several factors by themselves. It is likely that clusters of factors may need to coagulate in order for strong links to emerge. For instance, three-year-olds who speak both languages to HL-speaking parents AND attend SocL preschool for more than the average number of hours AND have not recently been to the country where the HL is spoken may stand a much greater chance of performing worse in the HL. Studies with larger groups of children are needed to investigate this. Furthermore, absolute and relative amounts of input in both languages, not investigated in the present study, are important additional factors to take into account (De Houwer, 2018c).

Most parents reported that language choice patterns with children had not changed since children's third birthdays, mirroring similar findings in De Houwer and Bornstein (2016). The Polish-speaking parents of BFLA preschoolers with better German than Polish skills who also spoke German with their Polish-speaking parents may find that with time, it becomes difficult to continue to speak Polish to children. They may eventually switch to German, thus effectively stopping the support for Polish. How Polish-speaking parents respond to preschoolers' use of German may thus be crucial in helping to determine whether children will continue to speak Polish in Germany. As Pułaczewska (2018, 2019) has documented, many Polish-German adolescents do not. More knowledge of factors explaining young bilinguals' variable language proficiency profiles will help Polish-German families in particular and bilingual families in general to support the continued development of the heritage language.

## Data availability statement

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

## Ethics statement

Ethical review and approval was not required for the study on human participants in accordance with the local legislation and institutional requirements. The patients/participants provided their written informed consent to participate in this study.

## Author contributions

AD designed the study and closely oversaw data collection and initial data coding (see Acknowledgements), carried out all specific coding for this study and its analyses, and wrote the manuscript.

## Funding

The University of Erfurt and the Harmonious Bilingualism Network provided the funding.

## Acknowledgments

Wholehearted thanks to the families who took part in this longitudinal study. Without their big and consistent effort, it simply could not have been realized. Alexandra Lazar and Tanja Mlynczak (TM) recruited the families. TM collected the data and translated

PEGEBOS-3 and BILTALK, originally developed in English for a similar study on English-German early bilinguals, into Polish, and BILTALK into German, and carried out the pilot. Bianca Mohr set up the surveys through SurveyMonkey. TM and Tomke Meyer carried out basic coding of the survey responses. I thank these assistants for their enthusiastic cooperation and good team work.

## Conflict of interest

The author declares that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

## Publisher's note

All claims expressed in this article are solely those of the authors and do not necessarily represent those of their affiliated organizations, or those of the publisher, the editors and the reviewers. Any product that may be evaluated in this article, or claim that may be made by its manufacturer, is not guaranteed or endorsed by the publisher.

## Supplementary material

The Supplementary material for this article can be found online at: https://www.frontiersin.org/articles/10.3389/fpsyg.2023.1080122/full#supplementary-material

SUPPLEMENTARY DATA SHEET 1 - APPENDICES A-D

APPENDIX A: Language proficiency questions.

APPENDIX B: Overall language choice questions in PEGEBOS-3.

APPENDIX C: Overall language choice questions in PEGEBOS-3 about language choice in public.

APPENDIX D: Detailed language choice questions.

## References

Abbot-Smith, K., Patrycja Morawska-Patera, P., Łuniewska, M., Spruce, M., and Haman, E. (2018). Using parental questionnaires to investigate the heritage language proficiency of bilingual children. *Child Lang. Teach. Ther.* 34, 155–170. doi: 10.1177/0265659018780958

Al-Azami, S. (2014). From Bengali to English: sequential bilingualism of a second-generation British Bangladeshi. *Int. J. Biling. Educ. Biling.* 17, 484–497. doi: 10.1080/13670050.2013.831025

Anderson, R. (2012). "First language loss in Spanish-speaking children," in *Bilingual language development & disorders in Spanish-English speakers*. ed. B. A. Goldstein (Baltimore, MD: Paul H. Brookes Publishing Co), 193–212.

Anstatt, T. (2009). "Der Erwerb der Familiensprache: Zur Entwicklung des Russischen bei bilingualen Kindern in Deutschland," in *Streitfall Zweisprachigkeit – The Bilingualism Controversy*. eds. I. Gogolin and U. Neumann (Wiesbaden: VS Verlag für Sozialwissenschaften), 111–131.

Anstatt, T. (2013). "Polnisch als Herkunftssprache: Sprachspezifische grammatische Kategorien bei bilingualen Jugendlichen," in *Deutsche Beiträge zum 15. Internationalen Slavistenkongress, Minsk*. eds. S. Kempgen, M. Wingender, F. Norbert and M. Jakiša (München: Otto Sagner), 15–25.

Anstatt, T., and Mikić, U. (2022). What does a receptive bilingual understand? Evidence from Polish as a heritage language in Germany. *Z. Slaw.* 67, 355–388. doi: 10.1515/slaw-2022-0017

Armon-Lotem, A., and Ohana, O. (2017). A CDI study of bilingual English-Hebrew children - frequency of exposure as a major source of variation. *Int. J. Biling. Educ. Biling.* 20, 201–217. doi: 10.1080/13670050.2016.1179257

Armon-Lotem, S., Rose, K., and Altman, C. (2021). The development of English as a heritage language: The role of chronological age and age of onset of bilingualism. *First Lang.* 41, 67–89. doi: 10.1177/0142723720929810

Besters-Dilger, J., Dąbrowska, A., Krajewski, G., Libura, A., Majewska, A., Müller, A.-M., et al. (2015). Linguistische und sprachdidaktische Aspekte der Herkunftssprache Polnisch. *Zeitschrift für Fremdsprachenforschung* 26, 51–83.

Brehmer, B. (2017). Bestimmung des Sprachstands in einer Herkunftssprache: Ein Vergleich verschiedener Testverfahren am Beispiel des Polnischen als Herkunftssprache in Deutschland. Determining proficiency in a heritage language: A comparison of different testing methods based on Polish as a heritage language in Germany. *Glottodidactica* 43, 47–60. doi: 10.14746/gl.2016.43.1.3

Brehmer, B., and Czachór, A. (2012). "The formation and distribution of the analytic future tense in Polish-German bilinguals," in *Multilingual individuals and multilingual societies*. eds. K. Braunmüller and C. Gabriel (Amsterdam: John Benjamins), 297–314.

Brehmer, B., Kurbangulova, T., and Winski, M. (2016). "Measuring lexical proficiency in Slavic heritage languages: A comparison of different experimental approaches" in *Slavic Languages in psycholinguistics: Chances and challenges for empirical and experimental research*. eds. T. Anstatt, C. Clasmeier and A. Gattnar (Narr: Tübingen), 225–256.

Brehmer, B., and Mehlhorn, G. (2020). "Die polnischsprachige Minderheit" in *Handbuch der Sprachminderheiten in Deutschland*. eds. R. Beyer and A. Plewnia (NARR: Tübingen), 395–431.

Brehmer, B., and Rothweiler, M. (2012). "The acquisition of gender agreement marking in Polish: A study of bilingual Polish-German-speaking children," in *Multilingual individuals and multilingual societies*. eds. K. Braunmüller and C. Gabriel (Amsterdam: John Benjamins), 81–100.

Brehmer, B., and Sopata, A. (2021). Word order in complex verb phrases in heritage Polish spoken in Germany. *Languages* 6:70. doi: 10.3390/languages6020070

Buac, M., Gross, M., and Kaushanskaya, M. (2014). The role of primary caregiver vocabulary knowledge in the development of bilingual children's vocabulary skills. *J. Speech Lang. Hear. Res.* 57, 1804–1816. doi: 10.1044/2014_JSLHR-L-13-0055

Budde-Spengler, N., Sachse, S., and Rinker, T. (2021). The relationship between input factors and early lexical knowledge in Turkish–German children. *Int. J. Biling. Educ. Biling.* 24, 1091–1106. doi: 10.1080/13670050.2018.1543647

Byers-Heinlein, C., and Werker, J. (2013). Lexicon structure and the disambiguation of novel words: Evidence from bilingual infants. *Cognition* 128, 407–416. doi: 10.1016/j.cognition.2013.05.010

Caminal, R., Cappellari, L., and Di Paolo, A. (2021). Language-in-education, language skills and the intergenerational transmission of language in a bilingual society. *Labour Econ.* 70:101975. doi: 10.1016/j.labeco.2021.101975

Chondrogianni, V., and Schwartz, R. (2020). Case and word order in Greek heritage children. *J. Child Lang.* 47, 766–795. doi: 10.1017/S0305000919000849

Czapka, S., Topaj, N., and Gagarina, N. (2021). A four-year longitudinal comparative study on the lexicon development of Russian and Turkish heritage speakers in Germany. *Languages* 6:27. doi: 10.3390/languages6010027

De Houwer, A. (1990). *The acquisition of two languages from birth: A case study*. Cambridge: Cambridge University Press.

De Houwer, A. (2007). Parental language input patterns and children's bilingual use. *Appl. Psycholinguist.* 28, 411–424. doi: 10.1017/S0142716407070221

De Houwer, A. (2009). *Bilingual first language acquisition*. Bristol: Multilingual Matters.

De Houwer, A. (2010). "Assessing lexical development in bilingual first language acquisition: what can we learn from monolingual norms?" in *Multilingual norms*. ed. M. Cruz-Ferreira (Frankfurt: Peter Lang), 279–322.

De Houwer, A. (2017a). "Minority language parenting in Europe and children's well-being," in *Handbook on positive development of minority children and youth*. eds. N. Cabrera and B. Leyendecker (Cham: Springer), 231–246.

De Houwer, A. (2017b). PEGEBOS-3. An online questionnaire for parents of polish-German and English-German three-year-olds. Manuscript. Available at: https://www.habilnet.org/science/#resources

De Houwer, A. (2018a). *BILTALK, talk and interaction questions for parents in bilingual settings*. Manuscript. Available at: https://www.habilnet.org/science/#resources

De Houwer, A. (2018b). "Input, context and early child bilingualism: implications for clinical practice," in *Handbook of communication disorders: Theoretical, empirical, and applied linguistic perspectives*. eds. A. Bar-On and D. Ravid (Berlin: Walter de Gruyter), 599–616.

De Houwer, A. (2018c). "The role of language input environments for language outcomes and language acquisition in young bilingual children," in *Bilingual cognition*

*and language: The state of the science across its subfields*. eds. D. Miller, F. Bayram, J. Rothman and L. Serratrice (Amsterdam: John Benjamins), 127–153.

De Houwer, A. (2019a). Equitable evaluation of bilingual children's language knowledge using the CDI: It really matters who you ask. *J. Monolingual Biling. Speech* 1, 32–54. doi: 10.1558/jmbs.11184

De Houwer, A. (2019b). Language choice in bilingual interaction. In HouwerA. De and L. Ortega (Eds.), *The Cambridge handbook of bilingualism*. Cambridge: Cambridge University Press, 324–348.

De Houwer, A. (2020a). "Harmonious bilingualism: well-being for families in bilingual settings," in *Handbook of home language maintenance and development: Social and affective factors*. eds. A. Schalley and S. Eisenchlas (Berlin: Mouton de Gruyter), 63–83.

De Houwer, A. (2020b). Why do so many children who hear two languages speak just a single language? *Zeitschrift für Interkulturellen Fremdsprachenunterricht* 25, 7–26.

De Houwer, A. (2021). *Bilingual development in childhood*. Cambridge: Cambridge University Press.

De Houwer, A., and Bornstein, M. H. (2016). Bilingual mothers' language choice in child-directed speech: Continuity and change. *J. Multicult. Multiling. Dev.* 37, 680–693. doi: 10.1080/01434632.2015.1127929

De Houwer, A., Bornstein, M. H., and Putnick, D. L. (2014). A bilingual- monolingual comparison of young children's vocabulary size: Evidence from comprehension and production. *Appl. Psycholinguist.* 35, 1189–1211. doi: 10.1017/S0142716412000744

De Houwer, A., and Nakamura, J. (2022). "Developmental perspectives on parents' use of discourse strategies with bilingual children," in *Multilingualism across the lifespan*. eds. U. Røyneland and R. Blackwood (New York/Abingdon: Routledge), 31–55.

Flores, C., Santos, A. L., Jesus, A., and Marques, R. (2017). Age and input effects in the acquisition of mood in Heritage Portuguese. *J. Child Lang.* 44, 795–828. doi: 10.1017/S0305000916000222

Gagarina, N., and Klassert, A. (2018). Input dominance and development of home language in Russian-German Bilinguals. *Fron. Commun.* 3:40. doi: 10.3389/fcomm.2018.00040

Gagarina, N., Klassert, A., and Topaj, N. (2010). *Sprachstandstest Russisch für Mehrsprachige Kinder/Russian language proficiency test for multilingual children. ZAS Papers in Linguistics (ZASPiL 54—Sonderheft)*. Berlin: ZAS.

Gagarina, N., Klop, D., Kunnari, S., Tantele, K., Välimaa, T., Balčiūnienė, I., et al. (2012). *MAIN: Multilingual assessment instrument for narratives. ZAS papers in linguistics (ZASPiL 56)*. Berlin: ZAS.

Gaskins, D. (2020). Input-output effects in the bilingual first language acquisition of English and Polish: a usage-based perspective. *Linguist. Approaches Bilingual.* 10, 471–498. doi: 10.1075/lab.17072.gas

Gaskins, D., and Frick, M. (2022). Embodiment in directive sequences: The case of triadic interactions in a Polish-English bilingual family. *Int. J. Biling.* 27, 122–142. doi: 10.1177/13670069221078334

Gyogi, E. (2015). Children's agency in language choice: a case study of two Japanese-English bilingual children in London. *Int. J. Biling. Educ. Biling.* 18, 749–764. doi: 10.1080/13670050.2014.956043

Haman, E., Wodniecka, Z., Marecka, M., Szewczyk, J., Białecka-Pikul, M., Otwinowska, A., et al. (2017). How does L1 and L2 exposure impact L1 performance in bilingual children? Evidence from Polish-English migrants to the United Kingdom. *Front. Psychol.* 8:1444. doi: 10.3389/fpsyg.2017.01444

Hansen, P., Magdalena Łuniewska, M., Simonsen, H. G., Haman, E., Mieszkowska, K., Kołak, J., et al. (2019). Picture-based vocabulary assessment versus parental questionnaires: A cross-linguistic study of bilingual assessment methods. *Int. J. Biling.* 23, 437–456. doi: 10.1177/1367006917733067

Hiebert, L., and Rojas, R. (2021). A longitudinal study of Spanish language growth and loss in young Spanish-English bilingual children. *J. Commun. Disord.* 92:106110. doi: 10.1016/j.jcomdis.2021.106110

Jachimek, A., Dimroth, C., and Köpcke, K.-M. (2022). The acquisition of the NP in a German-Polish bilingual child. Evidence for cross-linguistic influence. *Discours*. 29. doi: 10.4000/discours.11800

Kašćelan, D., Prévost, P., Serratrice, L., Tuller, L., Unsworth, S., and De Cat, C. (2022). A review of questionnaires quantifying bilingual experience in children: Do they document the same constructs? *Biling. Lang. Congn.* 25, 29–41. doi: 10.1017/S1366728921000390

Kaufman, D. (2001). "Tales of L1 attrition – evidence from pre-puberty children" in *Sociolinguistic and psycholinguistic perspectives on maintenance and loss of minority languages*. eds. T. Ammerlaan, M. Hulsen, H. Strating and K. Yağmur (Waxmann: Münster), 185–202.

Klassert, A., Gagarina, N., and Kauschke, C. (2014). Object and action naming in Russian- and German-speaking monolingual and bilingual children. *Biling. Lang. Congn.* 17, 73–88. doi: 10.1017/S1366728913000096

Kulik, M. A. (2016). *Zweisprachige polnisch-deutsche Kinder: Polnischkenntnisse im Spracherwerbskontext*. Hamburg: Staats- und Universitätsbibliothek Hamburg.

Leśniewska, J., and Pichette, F. (2018). Crosslinguistic influence in English as the weaker language of French-English and Polish-English bilingual children. *Studia Linguistica Universitatis Iagellonicae Cracoviensis* 135, 131–146. doi: 10.4467/20834624SL.18.011.8470

Lundén, M., and Silvén, M. (2011). Balanced communication in mid-infancy promotes early vocabulary development: Effects of play with mother and father in mono- and bilingual families. *Int. J. Biling.* 15, 535–559. doi: 10.1177/1367006911425816

Meir, N., and Janssen, B. (2021). Child heritage language development: An interplay between cross-linguistic influence and language-external factors. *Front. Psychol.* 12:651730. doi: 10.3389/fpsyg.2021.651730

Meisel, J. (1989). "Early differentiation of languages in bilingual children," in *Bilingualism across the lifespan. Aspects of acquisition, maturity and loss*. eds. K. Hyltenstam and L. Obler (Cambridge: Cambridge University Press), 13–40.

Miękisz, A., Haman, E., Łuniewska, M., Kuś, K., O'Toole, C., and Katsos, N. (2017). The impact of a first-generation immigrant environment on the heritage language: productive vocabularies of Polish toddlers living in the UK and Ireland. *Int. J. Biling. Educ. Biling.* 20, 183–200. doi: 10.1080/13670050.2016.1179259

Mieszkowska, K., Łuniewska, M., Kołak, J., Kacprzak, A., Wodniecka, Z., and Haman, E. (2017). Home language will not take care of itself: Vocabulary knowledge in trilingual children in the United Kingdom. *Front. Psychol.* 8:1358. doi: 10.3389/fpsyg.2017.01358

Mills, A. E. (1985). "The acquisition of German," in *The crosslinguistic study of language acquisition*. ed. D. I. Slobin, The data, vol. *1* (Hillsdale, NJ: Lawrence Erlbaum Associates), 141–254.

Mirvahedi, S. H., and Cavallaro, F. (2020). Siblings' play and language shift to English in a Malay-English bilingual family in Singapore. *World Englishes* 39, 183–197. doi: 10.1111/weng.12417

Moustaoui, A. (2021). The discourses of heritage languages: development and maintenance within transnational Moroccan families in Spain. From language ideologies to resistance. *ELIA* 21, 15–51.

Okita, T. (2002). *Invisible work: Bilingualism, language choice and childrearing in intermarried families*. Amsterdam: John Benjamins.

Otwinowska, M., Meir, N., Ringblom, N., Karpava, S., and La Morgia, F. (2021). Language and literacy transmission in heritage language: Evidence from Russian-speaking families in Cyprus, Ireland, Israel and Sweden. *J. Multiling. Multicult. Dev.* 42, 357–382. doi: 10.1080/01434632.2019.1695807

Plewnia, A., and Rothe, A. (2011). "Spracheinstellungen und Mehrsprachigkeit. Wie Schüler über ihre und andere Sprachen denken" in *Sprache und Integration. Über Mehrsprachigkeit und Migration*. eds. L. M. Eichinger, A. Plewnia and M. Steinle (Tübingen: Narr), 215–253.

Portes, A., and Hao, L. (1998). E Pluribus Unum: Bilingualism and language loss in the second generation. *Sociol. Educ.* 71, 269–294. doi: 10.2307/2673171

Pułaczewska, H. (2018). *Mütter sprechen. Erziehung mit Herkunftssprache Polnisch am Beispiel Regensburg*. Hamburg: Dr. Kovač.

Pułaczewska, H. (2019). Importance of friendship. An overlooked predictor of heritage language skills and cultural knowledge in teenagers of Polish origin in Germany. *Learn. Cult. Soc. Interact.* 22:100244. doi: 10.1016/j.lcsi.2018.06.002

Reich, H. H. (2009). *Zweisprachige Kinder. Sprachenaneignung und sprachliche Fortschritte im Kindergartenalter*. Münster: Waxmann.

Ribot, K. M., Hoff, E., and Burridge, A. (2018). Language use contributes to expressive language growth: Evidence from bilingual children. *Child Dev.* 89, 929–940. doi: 10.1111/cdev.12770

Rinke, E., Flores, C., and Sopata, A. (2019). Heritage Portuguese and heritage Polish in contact with German: More evidence on the production of objects. *Languages* 4:53. doi: 10.3390/languages4030053

Rinker, T., Budde-Spengler, N., and Sachse, S. (2017). The relationship between first language (L1) and second language (L2) lexical development in young Turkish-German children. *Int. J. Biling. Biling. Educ.* 20, 218–233. doi: 10.1080/13670050.2016.1179260

Rodina, Y., Kupisch, T., Meir, N., Mitrofanova, N., Urek, O., and Westergaard, M. (2020). Internal and external factors in heritage language acquisition: Evidence from heritage Russian in Israel, Germany, Norway, Latvia and the United Kingdom. *Front. Educ.* 5:20. doi: 10.3389/feduc.2020.00020

Rodina, Y., and Westergaard, M. (2017). Grammatical gender in bilingual Norwegian-Russian acquisition: the role of input and transparency. *Biling. Lang. Cogn.* 20, 197–214. doi: 10.1017/s1366728915000668

Sawyer, J. (2016). In what language do you speak to yourself? A review of private speech and bilingualism. *Early Child. Res. Q.* 36, 489–505. doi: 10.1016/j.ecresq.2016.01.010

Schaefer, B., Ehlert, H., Kemp, L., Hoesl, K., Schrader, V., Warnecke, C., et al. (2019). Stern, gwiazda or star: Screening receptive vocabulary skills across languages in monolingual and bilingual German-Polish or German-Turkish children using a tablet application. *Child Lang. Teach. Ther.* 35, 25–38. doi: 10.1177/0265659018810334

Schneider, M. (2012a). *Sprachwahl in der bilingualen Praxis. Eine Langzeitstudie zum deutsch-polnischen Erstspracherwerb*. Stuttgart: ibidem Verlag.

Schneider, M. (2012b). "Sprachwahlmuster beim deutsch-polnischen Erstspracherwerb und der Einfluss älterer Geschwister," in *Mehrsprachigkeit aus deutscher Perspektive*. eds. B. Jańczak, K. Jungbluth and H. Weydt (Narr: Tübingen), 139–153.

Schwartz, M., Minkov, M., Dieser, E., Protassova, E., Moin, V., and Polinsky, M. (2015). Acquisition of agreement in Russian by monolingual and bilingual children: A cross-linguistic investigation. *Int. J. Biling.* 19, 726–752. doi: 10.1177/1367006914544989

Slavkov, N. (2015). Language attrition and reactivation in the context of bilingual first language acquisition. *Int. J. Biling. Educ. Biling.* 18, 715–734. doi: 10.1080/13670050.2014.941785

Smoczyńska, M. (1985). "The acquisition of Polish" in *The crosslinguistic study of language acquisition*. ed. D. I. Slobin, The Data, vol. *1* (Hillsdale, NJ: Lawrence Erlbaum Associates), 595–686.

Smoczyńska, M. (1999/2015). *Inwentarz rozwoju mowy i komunikacji: Słowa i zdania, Polish adaptation of the Mac Arthur-Bates Communicative Development Inventories: Words and Sentences*. Krakow: Instytut Badań Edukacyjnych.

Sopata, A. (2011). "Placement of infinitives in successive child language acquisition," in *The development of grammar: Language acquisition and diachronic change*. eds. E. Rinke and T. Kupisch (Amsterdam: John Benjamins), 105–121.

Sopata, A., and Długosz, K. (2022). Age of onset effects in child bilingual acquisition: identifying the turning point. *GEMA Online® J. Lang. Stud.* 22, 1–23. doi: 10.17576/gema-2022-2203-01

Sopata, A., Długosz, K., Brehmer, B., and Gielge, R. (2021). Cross-linguistic influence in simultaneous and early sequential acquisition: Null subjects and null objects in Polish-German bilingualism. *Int. J. Biling.* 25, 687–707. doi: 10.1177/1367006920988911

Sopata, A., and Putowska, A. (2020). "Polnisch als Herkunftssprache in Deutschland – Einfluss der Familiensprachenpolitik auf die Sprachentwicklung der Kinder," in *Angewandte Linguistik – Neue Herausforderungen und Konzepte*. eds. S. Adamczak-Krysztofowicz, A. Szczepaniak-Kozak and P. Rybszleger (Göttingen: Vandenhoeck & Ruprecht), 203–215.

Sorenson Duncan, T., and Paradis, J. (2020). How does maternal education influences the linguistic environment supporting bilingual development in child L2 learners of English? *Int. J. Biling.* 24, 46–61. doi: 10.1177/1367006918768366

Statistik Austria (2020). *Statistik des Bevölkerungsstandes*. Wien: Bundesanstalt Statistik.

Statistisches Bundesamt (2020). *Bevölkerung und Erwerbstätigkeit. Bevölkerung mit Migrationshintergrund – Ergebnisse des Mikrozensus 2019. Fachserie 1 Reihe 2.2*. Wiesbaden: Statistisches Bundesamt.

Sun, H., Low, J. M., and Chua, C. (2022). Maternal language proficiency and bilingual children's heritage language learning. *Int. J. Biling. Educ. Biling.* 1–15. doi: 10.1080/13670050.2022.2130153

Sun, H., Ng, S. C., O'Brien, B. A., and Fritzsche, T. (2020). Child, family, and school factors in bilingual preschoolers' vocabulary development in heritage languages. *J. Child Lang.* 47, 817–843. doi: 10.1017/S0305000919000904

Sun, H., Waschl, N., and Veera, R. (2022). Language experience and bilingual children's heritage language learning. *Stud. Second. Lang. Acquis.* 44, 1356–1383. doi: 10.1017/S0272263121000942

Szagun, G., Stumper, B., and Schramm, A. S. (2009). *Fragebogen zur frühkindlichen Sprachentwicklung (FRAKIS) und FRAKIS–K (Kurzform)*. Frankfurt: Pearson Assessment.

frontiers | Frontiers in Psychology

TYPE Original Research
PUBLISHED 17 April 2023
DOI 10.3389/fpsyg.2023.1134830



OPEN ACCESS

EDITED BY
Natalia Meir,
Bar-Ilan University, Israel

REVIEWED BY
Ioulia Kovelman,
University of Michigan, United States
Deanna Friesen,
Western University, Canada

*CORRESPONDENCE
Anders Højen
✉ hojen@au.dk

SPECIALTY SECTION
This article was submitted to Language Sciences, a section of the journal Frontiers in Psychology

RECEIVED 30 December 2022
ACCEPTED 30 March 2023
PUBLISHED 17 April 2023

CITATION
Højen A and Bleses D (2023) Relative heritage language and majority language use before school start explains variance in 2nd grade majority language but not reading skills. *Front. Psychol.* 14:1134830. doi: 10.3389/fpsyg.2023.1134830



# Relative heritage language and majority language use before school start explains variance in 2nd grade majority language but not reading skills

Anders Højen[1,2,3]* and Dorthe Bleses[1,2,3]

[1]Department of Linguistics, School of Communication and Culture, Aarhus University, Aarhus, Denmark, [2]TrygFonden's Center for Child Research, Department of Economics and Business Economics, Aarhus University, Aarhus, Denmark, [3]Centre for Integrated Register-Based Research, Department of Economics and Business Economics, Aarhus University, Aarhus, Denmark

The present study examined whether parents' and bilingual children's own relative use of the heritage language vs. the majority language in the homes of bilingual children in Denmark before school start explains variance in 2nd grade majority language skills and reading skills. The study included two groups of children: the Mixed bilinguals group (defined by having a native Danish and a nonnative parent, *N*=376) and the Heritage bilinguals group (defined by having parents who were both speakers of a Heritage language, *N*=276). Four-stage hierarchical regression analyses showed that, after accounting for type of bilingualism, socioeconomic status (SES) and home literacy environment quality, relative use of the heritage vs. the majority language explained variance in 2nd grade Danish language comprehension scores, but did not explain variance in two reading scores, namely decoding and reading comprehension. In addition, a home literacy factor denoting book exposure (number of books, frequency of reading, library visits, and age of beginning shared book reading) was a significant predictor of both 2nd grade language and reading outcomes, whereas SES became a nonsignificant predictor when adding home literacy and language use predictors. We interpret the results to mean that parents' and the child's own relative use of the heritage language vs. the majority language before school start does not influence bilingual children's early reading skills, whereas a supportive early home literacy environment is a positive predictor of reading skills independently of SES and parental majority language use and skill.

KEYWORDS

**bilingualism, heritage language use, minority language use, home literacy environments, socioeconomy, reading outcomes, literacy, reading development**

## 1. Introduction

Having good language and reading skills in the early years of school is an important foundation for academic achievement (e.g., Rabiner et al., 2016). In turn, those skills are predicted by early language and preliteracy skills children already before school start (e.g., Snow et al., 1998; Whitehurst and Lonigan, 1998; Bleses et al., 2016; Dale et al., 2023). However, many children are faced with the task of learning not only the language of schooling, the majority

language, but also a heritage language, often because one or both parents immigrated to another country. Because of the importance of skills in the language of schooling, parents of young bilingual or bilingual-to-be children may wonder whether their children are best supported by parents minimizing use of the heritage language in the home and prioritize the majority language. Studies often show that bilingual or immigrant children have lower academic achievement than other children, but this population also typically differs on other potentially important factors that have been shown to be correlated with language development and academic achievement, notably family socioeconomic status (SES; White, 1982) and the home literacy environment (Zauche et al., 2016; Højen et al., 2021). Therefore, the purpose of the present study was to determine whether variance in proportion of heritage language vs. majority language (Danish) use in the homes of 3–6-year-old bilingual children in Denmark explains variance in later Danish language and reading skills in 2nd grade.

## 1.1. Early predictors of language and reading kills in school

Language and reading skills in the first years of school are predicted by early oral language skills, such as vocabulary size and language comprehension, as well as preliteracy skills, such as phonological awareness and familiarity with print and letters (Snow et al., 1998; Whitehurst and Lonigan, 1998; McBride-Chang and Kail, 2002; Gonzalez et al., 2011; Bleses et al., 2016). Relationships of early skills in the language of schooling to later reading skills are found also in bilingual children (August and Shanahan, 2006; Demie and Strand, 2006; Kieffer, 2008; Halle et al., 2012). For example, Halle et al. (2012), in a large sample of almost 20,000 U.S. school children, including 2,700 language-minority children, examined educational outcomes as a function of when language minority students achieved English proficiency. They found that, after accounting for a range of control variables, language-minority children who were proficient in English at school start were able to keep pace with native English speakers in terms of educational outcomes. On the other hand, those who achieved English proficiency relatively late in school continued to have educational gaps with native speakers in reading (and even more so in math), and those who were not English proficient at school start but reached English proficiency in 1st grade showed intermediate outcomes.

The positive association between early majority language proficiency and educational outcomes might lead to the conclusion that parents of bilingual children ought to focus on majority language development and prioritize speaking the majority language over the heritage language in the home. However, the relationship of parents' use of heritage vs. majority language to later outcomes varies with outcome. For example, Winsler et al. (2014), in a study of children in kindergarten who experienced different degrees of heritage language use in the home, found that parents' use of the heritage language in the home was positively related to early cognitive/language development (Bayley measures) and math skills at school start. On the other hand, there were no reliable relationships of parents' degree of heritage language use to early literacy skills at kindergarten entry.

Thus, the results of Winsler et al. and Halle et al. indicate at the same time at that early majority language skills are important for educational outcomes and that use of the heritage language with the child in early childhood does not hinder favorable educational outcomes later in school. These results suggest a complex relationship of parents' early language use, children's language skill, and other factors to later reading skills. A possible reconciliation of the seemingly conflicting results is that parents' *absolute* use (i.e., minutes of daily use) of the majority language and the heritage language with bilingual children is more important than *relative* use (i.e., the percentage use of each language). In other words, children need rich interactions in whatever language parents can best provide those interactions in order to develop good language skills early in life and later reading skills, as suggested by Giguere and Hoff (2023). In support of this proposition, Mesa and Yeomans-Maldonado (2019) found that early oral skills in the heritage language had direct predictive relationships to reading skills in the majority language. If so, this would suggest that the timing of the onset of majority language/second language acquisition and parents' degree of use of the majority language are not of decisive importance for later majority language reading skills as long as the child gets stimulating language exposure. However, parents' degree of majority language use and timing of onset of majority language acquisition are two different dimensions.

## 1.2. Simultaneous and sequential bilingualism, language use, and language skills

Some bilingual children begin to acquire two languages at home from the beginning of life, often because one of the parents speaks a heritage language and the other parent speaks the societal majority language as a native language. Other bilingual or bilingual-to-be children grow up acquiring a heritage language at home and a second language, the majority language, predominantly outside of the home, at the latest when entering school. This is typically when both parents are native speakers of a language other than the majority language. Those two types of bilingualism are often referred to in the literature as simultaneous and sequential bilingualism, respectively. However, in a Danish context, where the present study was conducted, it is most common for children to enter childcare at about 12–15 months of age, which means that even bilingual children with two nonnative parents begin to be exposed to the majority language well within the age normally denoting simultaneous bilingualism (often tentatively set at <3 years of age). Therefore, to avoid confusion, we will later refer to bilingual children *in Denmark* with mixed Danish and heritage language parents as "Mixed bilinguals" and to bilingual children with two heritage language parents "Heritage bilinguals."

Both heritage and majority language acquisition develop predictably as a function of quantity of exposure to each language in the home. This has been found for several linguistic domains, for example receptive vocabulary, expressive vocabulary, processing speed, and morphology (Umbel and Oller, 1994; Hoff, 2018; Thordardottir, 2019). Simultaneous bilinguals have *earlier* exposure to the majority language in their homes than sequential bilinguals do, but given that simultaneous bilinguals receive majority language input in the home, they are also likely to receive *more* majority language input than sequential bilinguals in the preschool age. That is, simultaneous bilinguals will have a double advantage when entering school by having received majority language exposure in higher proportions and for a longer time compared to sequential bilinguals. But which is more important further downstream in majority

language development, high amounts or early onset of majority language input?

A study pitting amount of majority language exposure in the home against timing of exposure (age of first exposure) found that "amount trumps timing" in 1st and 3rd grade native English learners of French with respect to receptive and expressive vocabulary and morphology skills (Thordardottir, 2019). This was because the simultaneous vs. sequential bilingual group differences became nonsignificant when controlling for amount of exposure. However, when controlling for timing of exposure (but not amount of exposure), group differences remained significant for receptive vocabulary in 1st graders and for expressive vocabulary.

This finding of the importance of *quantity* of majority language exposure in the home environment seems to be at odds with the findings by Winsler et al. (2014), which suggested that parents' relative use of the heritage and majority language did not significantly influence later reading. However, note that Thordardottir (2019) measured majority *language* outcomes while by Winsler et al. (2014) measured early reading outcomes. It is conceivable that early reading is less impacted by degree of use of the majority language in the home because an important component of early reading is decoding skills. Decoding skills draw on phonological awareness, a skill that is not negatively influenced—but possibly positively influenced—by bilingualism (Hammer et al., 2014). Moreover, reading-related skills in general transfer better between languages than do oral language skills (Cummins, 1991; Adesope et al., 2010; Hammer et al., 2014).

At least one more factor complicates interpretation of relationship of parental language use (heritage vs. majority language) to child language development, namely parental language skill. If parents are a nonnative speakers, their skill level in the majority language will vary considerably, and their speech in child interactions may contain fewer of those lexical and grammatical properties that have been shown to positively predict child language development (Hoff et al., 2020). Therefore, nonnative parents with relatively low majority language skills may do their child a disservice by speaking the majority language rather than provide a richer heritage language model to help their child's heritage language development. Additionally, the child's own language use matters. A common pattern in bilingual families is that the child replies in the majority language even if the parent addresses the child in the heritage language. Children's degree of use of the majority language has been shown to predict *expressive* majority language growth over and above effects of majority language exposure, whereas children's majority language use did not predict language *comprehension*; only children's language exposure predicted comprehension (for a review, see Hoff et al., 2022).

The finding of the importance of parents' relative language use and skills for oral language development in bilingual children is in line with the convergence of bilingual research on usage-based accounts of bilingual language development indicating that language acquisition is a general cognitive process greatly influenced by language use and experience (Ellis, 2002; Hernandez et al., 2005; MacWhinney, 2005; Højen, 2019). These findings are also related to the important observation that monolinguals should be expected to function as "two monolinguals in one person" (Grosjean, 1989). However, factors other than relative use and skill have been shown to influence language development in bilingual children.

## 1.3. Relationship of socioeconomic status to language and reading outcomes

A ubiquitous factor in child development is family socioeconomic status (SES). SES is typically indexed by parental education level and income, and these factors have also been shown to be related to language and reading development (Ginsborg, 2006; Rowe et al., 2016). This is particularly worrying in the context of bilingualism because immigrant populations often have lower SES than non-immigrant populations, although this varies greatly across different immigrant populations and host countries (Dustmann et al., 2012). Moreover, in the context of Denmark, where the present study was carried out, we recently found evidence that the association between SES and young children's language/preliteracy outcomes was significantly *stronger* in some immigrant populations than in non-immigrants (Højen et al., 2019).

It is, of course, not parental income or education *per se* that influences children's language and reading outcomes. Part of the mechanism that transfers SES effects from parents to children has, as mentioned, been identified as parental language skill, and thereby the language models that they can provide for their children (Sullivan et al., 2021). In addition, the overall home literacy environment has been shown to mediate SES relationships to vocabulary development (Singh et al., 2022), and home literacy environments may be a stronger predictor of children's language and reading outcomes than traditional SES variables, income and education (Højen et al., 2021).

## 1.4. Relationship of home literacy environments to language and Reading outcomes

The home literacy environment traditionally refers to tangible literacy related resources in the home such as books or letters to play with, as well as language-and literacy-oriented parent practices with the child, such as shared book reading, nursery rhymes, and singing (Sénéchal et al., 1998; Foy and Mann, 2003). In addition, after the last decade's surge in use of mobile screen media, the nature of the digital home literacy and its effect on child development have gained interest in recent years (Segers and Kleemans, 2020; Turco et al., 2023). When many of children's experiences with child literature and exposure to literacy come from mobile screen devices, it is clear that this is an important new aspect of the home literacy environment. This is particularly interesting in the context of bilingual children; children's books and literacy materials may not be easily available in the heritage language of bilingual families but may become accessible digitally. However, although Segers and Kleemans (2020) found that the digital and analogue home literacy environments constituted different factors, the digital factor was not related to child language outcomes. A similar finding was reported by Turco et al. (2023), who found a simple *negative* association between child use of digital media and their language and reading outcomes; the association, however, was driven by demographic characteristics of the family. Thus, since the literature on digital home literacy environments is only in its infancy, much more research is needed to document associations—positive or negative—with different aspects of the digital home literacy environment to child outcomes.

On the other hand, there is a well-documented association between the analogue home literacy environment (hereafter, just "the home literacy environment") and children's language and early literacy/reading development. This association has been found in both monolingual children (Sénéchal et al., 1998; Foy and Mann, 2003) and bilingual children (Sénéchal and LeFevre, 2014; Højen et al., 2021) and mixed monolingual/bilingual samples (Segers and Kleemans, 2020). In addition, Højen et al. (2021) found that the association between the home literacy environment and language outcomes was *stronger* in bilingual 4–6-year-olds compared to their monolingual peers. This result points to the importance of a highly supportive environment for bilingual children, whose language acquisition task is doubled. However, at the same time, the study found that home literacy environments of sequential bilinguals were substantially poorer (about 0.30 to 1.25 standard deviation depending on the measure) than those of Danish monolingual children, whereas the quality of the home literacy environments of simultaneous bilinguals was very similar to those of Danish monolinguals. This difference could be related to a lower SES on average in parents of sequential bilinguals (both parents being immigrants) and/or to unavailability of books and other literacy materials in the heritage languages.

### 1.5. The present study

In summary, previous research shows that early language skills are related to later language and reading skills in school in bilingual children as well as monolingual children. Early majority language skills, as well as heritage language skills, in bilingual children are predictably related to degree of parents' use of the majority language vs. the heritage language in the home, their language skills and the child's own degree of use of the majority language (although only expressive skills). However, while longer-term reading outcomes in the majority language are related to early majority language skills (Halle et al., 2012), they may not be related to degree of parents' early language use of the majority language in the home (Winsler et al., 2014). This draws a pattern of complex predictors of reading skills in bilingual children and raises the possibility that parents speaking a heritage language can prioritize speaking the heritage language with the child in the home before school start without detrimental effects for the child's later reading outcomes. However, other factors such as SES and the home literacy environments are also related to language and reading outcomes as noted earlier. And in a Danish context, heritage bilingual families (often having refugee background) have lower average SES and poorer home literacy environments than mixed bilingual families (Højen et al., 2021), which means that those factors should be controlled when examining the relationship of the child's early language experiences in the home to later majority language and reading outcomes.

Therefore, the present study asks whether bilingual children's language experiences (parents' and child's own majority language vs. the heritage language use as well as parent's majority language skills) in the home before school start explain variance in children's 2nd grade majority language and reading scores after accounting for type of bilingualism (mixed vs. heritage bilinguals), family SES, and home literacy environments. Note that children's own early language skills are not considered here, as we focus on the early language environment. Our specific research questions are:

1. Does degree of relative use of the heritage language and majority language in the home of preschool-age bilingual children explain a significant amount of variance in their 2nd grade majority language and reading skills after controlling for type of bilingualism (mixed vs. heritage), family SES, and home literacy environment quality?
2. Are relationships of parental heritage language use in the home to bilingual children's 2nd grade majority language and reading skills moderated by type of bilingualism (mixed vs. heritage)?
3. Are relationships of parental heritage language use to bilingual children's 2nd grade majority language and reading skills moderated by parental majority language skill?

## 2. Materials and methods

### 2.1. Participants

The 652 bilingual children of the present study were 2nd graders from 213 different Danish schools who completed a nationwide mandatory test battery of Danish language and reading skills in the years 2016–2018. Three to 5 years prior to the 2nd grade test, when the children were in childcare, they were all enrolled in either of two parallel randomized control (RCT) studies in language and preliteracy intervention. Both were brief low-cost language and literacy interventions (20 weeks) nested in the usual childcare program with bi-weekly 30-min lessons (Bleses et al., 2018a,b). The original sample for the RCTs consisted of both monolingual and bilingual children. The present sample is a subsample of those children, namely children who (1) had one or two nonnative parents (2) had questionnaire information regarding home literacy environments and minority language use filled in by their parents at pretest of the original RCTs, and (3) had taken the language and reading test in primary school's 2nd grade. In each RCT, the children were either in a control group or in one of three intervention arms.

This sample consists of 376 children with a native Danish parent and a nonnative parent and 276 children with two nonnative parents. The questionnaire items pertaining to the native languages of the mother and father were used to classify children as either "heritage" bilinguals (both parents were native speakers of a heritage language) or "mixed" bilinguals (one native Danish speaking and one nonnative parent). In the abovementioned RCTs, the children had been either in a control group (Heritage bilinguals $N = 54$, Mixed bilinguals $N = 100$) or in one of three intervention arms (Heritage bilinguals $N = 222$, Mixed bilinguals $N = 276$). For Heritage bilinguals, the most frequent heritage languages were Arabic, Turkish, Yugoslavian (Serbian, Croatian, Bosnian), Kurdish, Somali, Urdu, and German. For Mixed bilinguals, the most frequent heritage languages of the nonnative parents were English, Polish, Russian, Thai, Kurdish, Arabic and German; the mother was the nonnative speaker in 60% of those children, and the father was the nonnative in the remaining 40%.

About 30% of the original, representative sample did not answer and submit the questionnaire, and non-responders had lower SES. The present subsample of bilingual questionnaire responders is thus not representative (higher SES), but because questionnaire information was used to classify participants as bilinguals, it cannot be determined exactly how bilinguals in our subsample differ from bilinguals not

included (because of missing questionnaire information). However, given that responding to the multi-item questionnaire required a certain degree of literacy and Danish-language skills, parents lacking in those skills were necessarily underrepresented. Mean characteristics of the two participant groups are shown in Table 1.

As shown in Table 1, parents of Mixed bilinguals had higher SES than parents of Heritage bilinguals. In addition, although we do not have data documentation, it is very likely that a comparatively higher proportion of parents of Heritage bilinguals (two nonnative parents) had refugee background, whereas a comparatively higher proportion of parents of Mixed bilinguals (one native Danish and one nonnative parent) had work-or partner-related immigration backgrounds. Those differences together with the differences in the most frequent heritage language backgrounds, mean that the two groups of bilingual children differed not solely in whether or not they had the opportunity to learn Danish from a native parent in the home, which should be considered in the analyses following below.

## 2.2. Measures

### 2.2.1. Maternal education and income

Two SES control variables were used: (1) maternal education measured in years of formal schooling in Denmark, and (2) gross house-hold income before any taxes, tax deductions, or welfare benefits. We obtained both measures from Statistics Denmark. Unfortunately, Statistics Denmark has reliable information only about degrees obtained in the Danish educational system, not about degrees obtained in the home countries. However, parental education obtained in the heritage language has previously been found to be predictive of children's heritage language skills, whereas parental information obtained in the majority language of a host country has been found to be predictive of children's second-language/majority-language skills (Hoff et al., 2018), which are the skills examined in the present study. In addition, a previous study, which included the present sample, found maternal education to be very predictive of bilingual children's second language at age 4–6 (Højen et al., 2021). But total years of formal schooling is necessarily underestimated in parents who immigrated after having begun school.

### 2.2.2. National tests in language and reading in 2nd grade

The three outcome variables were 2nd grade scores in an oral language test (Danish language comprehension) and two reading tests (word decoding and reading comprehension). The scores were obtained from a Danish national test battery for all 2nd graders (Beuchert and Nandrup, 2017), and we were granted access to the scores via the national registry, Statistics Denmark.

The language comprehension test tests the understanding of Danish words, sentences, and proverbs in a multiple-choice format. The test is presented in written format, which means that there is a reading component in the skills required to complete the test. The decoding test tests the ability to identify possible Danish words by segmenting word strings, and the reading comprehension test tests the ability to read and understand a text by subsequently checking correct answers regarding the content of the text in a multiple-choice format. Students are assigned percentile scores, but presently we used standardized theta scores which are better suited for statistical analyses. Standardization was done on the whole population of 2nd graders who took the test, which means that a score of zero corresponds to the national mean.

### 2.2.3. Home literacy environments

Home literacy environments during the preschool years was measured via parental report prior to entering the above-mentioned language and preliteracy intervention studies. The questionnaire contained multiple items each rated on Likert scales, but presently we use the two home literacy environment factors identified in principal component analysis and used as predictors in previous research on the overall sample (i.e., including monolingual children; Højen et al., 2021, 2022). We use the standardized factor values obtained for the overall sample including also monolingual children. The items constituting the factor *book exposure* pertained to number of adults' books in the home, number of children's books, frequency of library and bookshop visits, frequency of shared book reading in the past week, and the child's age when beginning shared book reading. The items constituting the factor *literacy activities* pertained to frequency of talking about letters, frequency of talking about numbers, frequency of singing with the child, and frequency of nursery rhymes and word plays.

### 2.2.4. Heritage language and majority language use

The questionnaire filled in prior to the preschool RCT asked parents to rate both mother's and father's use of Danish vs. the heritage language in the home (5-point scale from *Mother language only (no Danish)* to *Danish only*), mother's and father's Danish language skills (5-point scale from *no skill at all* to *fluent*), and the child's use of Danish in the home, in childcare, and when with friends (all three rated by parents on five-point scales from *no Danish* to *Danish only*). That is, the questionnaire examined *relative* use of the heritage language and Danish, but not *absolute use*.

## 2.3. Analytic strategy

Descriptive data analysis of all variables is first provided including zero-order correlations between predictors and outcome

TABLE 1 Basic mean characteristics of each bilingual group; *p*-value and $\eta^2$ effect size for group differences (ANOVA).

| | Heritage bilinguals N=276 (56% boys) | | Mixed bilinguals *N*=376 (53% boys) | | Group difference | |
|---|---|---|---|---|---|---|
| | Mean | SD | Mean | SD | *p* | $\eta^2$ |
| Maternal education, years | 12.7 | 3.5 | 15.2 | 2.7 | <0.001 | 0.14 |
| Household income, 100 K DKK | 3.2 | 3.1 | 5.4 | 3.5 | <0.001 | 0.10 |

TABLE 2 Means and standard deviations for outcome and predictor variables for each bilingual group; *p*-value and $\eta^2$ effect size for group differences (ANOVA).

| | Heritage bilinguals | | Mixed bilinguals | | Group difference | |
|---|---|---|---|---|---|---|
| | Mean | SD | Mean | SD | *p* | $\eta^2$ |
| *2nd grade Language and literacy outcomes* | | | | | | |
| Language comprehension | −0.67 | 1.14 | 0.04 | 0.81 | <0.001 | 0.11 |
| Decoding | −0.23 | 1.04 | 0.16 | 0.50 | <0.001 | 0.04 |
| Reading comprehension | −0.35 | 1.02 | 0.11 | 0.85 | <0.001 | 0.05 |
| *Predictors* | | | | | | |
| Book exposure | −1.35 | 1.20 | −0.01 | 1.05 | <0.001 | 0.26 |
| Literacy activities | −0.20 | 0.91 | −0.09 | 1.01 | =0.143 | 0.00 |
| Maternal Danish-language skills | 3.9 | 1.1 | 4.6[1] | 0.8 | <0.001 | 0.12 |
| Maternal Danish-language use | 2.7 | 1.0 | 3.8[2] | 1.1 | <0.001 | 0.21 |
| Paternal Danish-language skills | 3.6 | 1.2 | 4.4[3] | 1.1 | <0.001 | 0.09 |
| Paternal Danish-language use | 2.6 | 1.2 | 3.9[4] | 1.3 | <0.001 | 0.21 |
| Child's Danish-language use at home | 3.4 | 1.0 | 4.3 | 0.8 | <0.001 | 0.21 |
| Child's Danish-language use in childcare | 4.7 | 0.7 | 4.9 | 0.4 | <0.001 | 0.05 |
| Child's Danish-language use with friends | 3.8 | 1.1 | 4.5 | 0.8 | <0.001 | 0.15 |

[1]The means were 5.0 (0.3) for native Danish mothers and 4.3 (0.91) for nonnative mothers.
[2]The means were 4.5 (0.7) for native Danish mothers and 3.4 (1.11) for nonnative mothers.
[3]The means were 4.8 (0.7) for native Danish fathers and 3.7 (1.4) for nonnative fathers.
[4]The means were 4.4 (1.1) for native Danish fathers and 3.1 (1.4) for nonnative fathers.

variables. Predictors that were significantly related to outcomes in the correlation analysis were retained as predictors of the three outcome variables in subsequent hierarchical regression models. The predictors were entered in blocks to examine the extent to which a block of language use variables and parent majority language skill variables explain variance in the three outcome variables (language comprehension, decoding, and reading comprehension) after accounting for type of bilingualism (Heritage vs. Mixed), SES (maternal education and household income), and home literacy environment variables. All analyses were carried out in STATA 15. STATAs *nestreg* function was used for the hierarchical regressions; standard errors were adjusted for clustering in schools.

# 3. Results

## 3.1. Descriptive statistics and preliminary analysis

Before examining the main questions of predictions of language and reading skills, this section gives basic descriptive statistics of the variables involved. Table 2 shows mean characteristics of the two bilingual groups. Because the 2nd grade language and reading outcomes are standardized on the national mean, the negative values for the Heritage bilinguals indicate a performance somewhat below the national mean, while the Mixed bilinguals have scores just above the national mean. Likewise, the home literacy environment factors Book exposure and Literacy activities are standardized values, based on a sample including monolinguals. Heritage bilinguals had Book exposure values well below the mean of 0 for the overall sample.

Note that, for the Mixed bilinguals, the mean values for maternal and paternal Danish-language skills and use are based on one native Danish parent and one nonnative parent. In four notes under Table 2, mean values are given for the native Danish and nonnative parent in those families. The mean value for the native Danish mothers' and fathers' Danish-language skills were unsurprisingly near the ceiling value (5), whereas their degrees of Danish-language use were a little lower. This indicates some degree of use of the partner's heritage language. The nonnative parent in the Mixed bilingual group had generally higher Danish-language skills and use than the nonnative parents in the Heritage bilingual group, except for paternal Danish-language skills, which were about the same in the two groups.

The two groups of bilinguals differed significantly on all but one variable, with Mixed bilinguals having higher 2nd grade Danish-language and reading scores, more supportive home literacy environments during the preschool years, higher own use of Danish in the preschool years, and higher parental use of Danish as well as higher parental Danish skills, according to self-report. Only for the extent of preschool literacy activities were the two bilingual groups similar.

As an initial examination of the relationship of our predictors to the outcomes, Table 3 shows zero-order correlations.

All predictors, except for the literacy activities factor, were significantly correlated with the three outcomes. Among the two SES predictors, maternal education coefficients were slightly higher than those for household income. Among the home literacy environment predictors, book exposure was clearly more strongly correlated with outcomes than literacy activities were. Among the language use and skills predictors, maternal Danish use and skills as well as the child's own Danish use patterns were more strongly correlated with the outcomes than paternal skills and use were. Changing the perspective

TABLE 3 Zero-order correlations of predictors to the three outcomes, language comprehension, decoding, and reading comprehension for the two groups of bilinguals combined.

| | Lang. comp. | Decoding | Read. comp. |
|---|---|---|---|
| Maternal education | 0.37 | 0.26 | 0.26 |
| Household income | 0.30 | 0.22 | 0.20 |
| Book exposure | 0.41 | 0.30 | 0.33 |
| Literacy activities | 0.02 | 0.01 | 0.03 |
| Maternal Danish-language skills | 0.26 | 0.18 | 0.18 |
| Maternal Danish-language use | 0.23 | 0.11 | 0.12 |
| Paternal Danish-language skills | 0.16 | 0.14 | 0.13 |
| Paternal Danish-language use | 0.16 | 0.13 | 0.09 |
| Child's Danish-language use at home | 0.28 | 0.13 | 0.12 |
| Child's Danish-language use in childcare | 0.20 | 0.13 | 0.10 |
| Child's Danish-language use with friends | 0.31 | 0.17 | 0.14 |

All correlations were statistically significant ($ps < 0.001$), except for the correlations involving the literacy activities factor ($ps > 0.400$).

to the three outcomes in 2nd grade, language comprehension was generally more strongly correlated with the predictors than decoding and reading comprehension were.

The correlations were generally weak to moderate, but of similar magnitude to comparable correlations previously found—for example, maternal education with child reading ($r = 0.23$, $p < 0.05$), or number of books in the home with child reading ($r = 0.36$, $p < 0.001$) in same-age native Dutch monolingual children (van Bergen et al., 2017). Therefore, each variable explains on a small part of the variance in the outcome variables, Book exposure being the most potent predictor, explaining 17% ($0.41^2$) of the variance in language comprehension.

Recall that the children were originally sample for two intervention studies (see section 2.1). We correlated a binary variable for participation in the control or an intervention group in childcare with the three outcomes in 2nd grade. The correlation was around 0 and nonsignificant in all three cases (language comprehension, $r = -0.02$, $p = 0.560$; decoding, $r = -0.03$, $p = 0.404$; reading comprehension, $r = -0.01$, $p = 0.835$). Although there may be small differences in the long-term effect of the different intervention arms, we consider those differences unlikely to influence the present results, and, for parsimony, we do not include the intervention variable in the below models (except for in a robustness check, see below).

## 3.2. Predicting bilinguals' 2nd grade Danish-language and reading outcomes

Our first question was how heritage language vs. majority language use patterns before school start predict bilingual students' Danish majority language and reading skills in 2nd grade. We wanted to determine the extent to which language use patterns explain variance in majority language and reading outcomes after accounting for variance related to bilingual group (Heritage vs. Mixed bilingualism), SES, and home literacy environment quality. Therefore, we estimated three series of hierarchical regression models, one for each of the three outcomes. For each series, blocks of predictors were entered in four stages. Stage 1: Bilingual group. Stage 2: SES. Stage 3: Home literacy environments. Stage 4: Child and parent use of heritage language vs. Danish use, and parent Danish language skills.

All 12 models were statistically significant ($ps < 0.001$). Tables 4–6 show, for each of the three outcomes, how much variance is explained at each stage, how much additional variance is accounted for by entering new predictors at each stage, as well as coefficients for individual predictors at each stage.

Table 4 shows the 2nd grade language comprehension estimates. As expected, the stage 1 model, with just bilingual group as a predictor, reveals that Mixed bilinguals have higher scores than Heritage bilinguals do. Adding SES predictors (stage 2) significantly increased variance explained by 7%, home literacy predictors (stage 3) explained an additional significant 4%, and language use patterns (stage 4) yet an additional significant 4%.

Table 5 shows the 2nd grade decoding estimates. Aga in, the stage 1 model, reveals a substantial bilingual group difference in favor of Mixed bilingualism, but the group coefficient for decoding was only half the size of the group coefficient found for language comprehension. Adding SES predictors significantly increased variance explained by 5%, home literacy predictors explained an additional significant 3%, but while language use patterns explained an additional 2%, this addition was not statistically significant.

Table 6 shows the 2nd grade reading comprehension estimates. Again, the stage 1 model, reveals a substantial bilingual group difference in favor of Mixed bilingualism, but the group coefficient for reading comprehension was much smaller than for language comprehension. Adding SES predictors increased variance explained by 4%, home literacy predictors explained an additional 5%, but while language use patterns explained an additional 1%, this addition was not statistically significant.

In summary, the full model of 2nd grade Danish language comprehension explained 29% of the variance. For decoding and reading comprehension, the full models explained less variance, namely 15 and 16%. The pattern of results that emerged from the four-stage models is that heritage language use frequency and parental Danish-language skills in the preschool years explained a small but significant part of the variance in bilingual children's 2nd grade Danish language comprehension skills after having accounted for type of bilingualism, SES, and home literacy environments; however, this was not the case for the decoding and reading comprehension outcomes. As a robustness check, we estimated models similar to those in

TABLE 4 Four-stage hierarchical regression model of 2nd grade language comprehension scores predicted by type of bilingualism (Heritage is reference category), SES, home literacy environments before entering school, and child use and parental skill and use of Danish before entering school.

| Language comprehension model | | β | SE | p | $R^2$ | $\Delta R^2$ |
|---|---|---|---|---|---|---|
| Stage 1 | Type of bilingualism | 0.81 | 0.11 | 0.001 | 0.14 | |
| Stage 2 | Type of bilingualism | 0.53 | 0.10 | 0.001 | 0.21 | 0.07*** |
| | Maternal education | 0.19 | 0.04 | 0.001 | | |
| | Household income | 0.19 | 0.06 | 0.002 | | |
| Stage 3 | Type of bilingualism | 0.33 | 0.10 | 0.001 | 0.25 | 0.04*** |
| | Maternal education | 0.10 | 0.05 | 0.038 | | |
| | Household income | 0.13 | 0.06 | 0.027 | | |
| | Book exposure | 0.23 | 0.04 | 0.001 | | |
| | Literacy activities | −0.00 | 0.05 | 1.000 | | |
| Stage 4 | Type of bilingualism | 0.21 | 0.10 | 0.041 | 0.29 | 0.04*** |
| | Maternal education | 0.09 | 0.05 | 0.075 | | |
| | Household income | 0.10 | 0.06 | 0.083 | | |
| | Book exposure | 0.19 | 0.04 | 0.001 | | |
| | Literacy activities | −0.01 | 0.04 | 0.853 | | |
| | Maternal Danish-language skills | 0.08 | 0.07 | 0.219 | | |
| | Maternal Danish-language use | −0.01 | 0.06 | 0.873 | | |
| | Paternal Danish-language skills | 0.14 | 0.07 | 0.032 | | |
| | Paternal Danish-language use | −0.13 | 0.07 | 0.059 | | |
| | Child's Danish-language use at home | 0.07 | 0.08 | 0.473 | | |
| | Child's Danish-language use in childcare | 0.06 | 0.08 | 0.578 | | |
| | Child's Danish-language use with friends | 0.16 | 0.08 | 0.035 | | |

***$p < 0.001$.

Tables 4–6 with the above-mentioned binary predictor indicating whether the children had been in a control group or an intervention group (that is, not differentiating between the type of intervention group). The variable indicating intervention was entered at stage 1. The added intervention group variable explained no variance in the 2nd grade outcomes on its own ($R^2 = 0.000–0.001$), and accordingly did not change the results of the models reported.

Our second research question asked whether relations of parental majority vs. heritage language use to child language and reading outcomes differ significantly between Heritage and Mixed bilinguals. Recall that, not surprisingly, mean levels of Danish use in the home were significantly higher (and levels of heritage language use lower) among parents of Mixed bilinguals than among parents of Heritage bilinguals. Additionally, Mixed bilinguals had significantly higher Danish language and reading scores in 2nd grade, which could be causally related to more Danish exposure in the home before entering school. But at the same time, Mixed bilinguals also had parents with higher SES and had better home literacy environments than Heritage bilinguals. To determine if type of bilingualism moderated effects of parental use of Danish vs. the heritage language when controlling for SES and home literacy environment quality, we estimated follow-up models which had interaction terms for both maternal and paternal Danish use × bilingual group. Apart from the interaction terms, the models were identical to the above stage 4 model for each of the three outcomes. However, neither of the follow-up models revealed significant interactions ($p$-values between 0.063 and 0.934). The one interaction approaching significance ($p = 0.063$) was a trend toward a positive relationship of more maternal Danish use to 2nd grade language comprehension in Heritage bilinguals, which was not found in Mixed bilinguals. However, given that we examined six interaction terms (three outcomes, both maternal and paternal language use in interaction with bilingual group) in order to answer essentially the same question, Bonferroni corrections are probably appropriate, in which case no interaction approached significance. Accordingly, we conclude that the relations of parental heritage language vs. majority language use did not differ significantly between Mixed and Heritage bilinguals. The full interaction models are provided in Supplementary material.

Research question 3 asked whether the relationship of parental Danish-language use to children's outcomes is modified by parental Danish skills. We addressed this question by estimating follow-up models which had interaction terms for both maternal and paternal Danish use × Danish skills but were otherwise identical to the above stage 4 model for each of the three outcomes. However, neither of the follow-up models revealed significant interactions ($p$-values between 0.148 and 0.902); that is, parental Danish language skill did not significantly moderate the relationship of degree of Danish use to child language and reading outcomes.

Having addressed our three specific research questions, we now explore how individual predictors relate to bilingual children's 2nd grade outcomes. The large effect of type of bilingualism—indicating an advantage of Mixed over early Heritage bilingualism—is substantially reduced for all three outcomes when adding SES, home literacy environment and language use patterns as controls, and

TABLE 5 Four-stage hierarchical regression model of 2nd grade decoding scores predicted by type of bilingualism (Heritage is reference category), SES, home literacy environments before entering school, and child use and parental skill and use of Danish before entering school.

| Decoding model | | $\beta$ | *SE* | *p* | $R^2$ | $\Delta R^2$ |
|---|---|---|---|---|---|---|
| Stage 1 | Type of bilingualism | 0.42 | 0.09 | 0.001 | 0.047 | |
| Stage 2 | Type of bilingualism | 0.20 | 0.10 | 0.039 | 0.10 | 0.05*** |
| | Maternal education | 0.15 | 0.04 | 0.001 | | |
| | Household income | 0.15 | 0.06 | 0.012 | | |
| Stage 3 | Type of bilingualism | 0.05 | 0.10 | 0.658 | 0.13 | 0.03*** |
| | Maternal education | 0.08 | 0.04 | 0.071 | | |
| | Household income | 0.10 | 0.06 | 0.083 | | |
| | Book exposure | 0.18 | 0.05 | 0.001 | | |
| | Literacy activities | 0.00 | 0.04 | 0.957 | | |
| Stage 4 | Type of bilingualism | 0.01 | 0.11 | 0.962 | 0.15 | 0.02 |
| | Maternal education | 0.08 | 0.04 | 0.079 | | |
| | Household income | 0.10 | 0.06 | 0.130 | | |
| | Book exposure | 0.16 | 0.05 | 0.001 | | |
| | Literacy activities | −0.00 | 0.04 | 0.998 | | |
| | Maternal Danish-language skills | 0.02 | 0.06 | 0.697 | | |
| | Maternal Danish-language use | −0.05 | 0.06 | 0.475 | | |
| | Paternal Danish-language skills | 0.10 | 0.06 | 0.073 | | |
| | Paternal Danish-language use | −0.01 | 0.07 | 0.824 | | |
| | Child's Danish-language use at home | −0.03 | 0.08 | 0.706 | | |
| | Child's Danish-language use in childcare | 0.08 | 0.08 | 0.455 | | |
| | Child's Danish-language use with friends | 0.08 | 0.08 | 0.294 | | |

***$p < 0.001$.

TABLE 6 Four-stage hierarchical regression model of 2nd grade reading comprehension scores predicted by type of bilingualism (Heritage is reference category), SES, home literacy environments before entering school, and child use and parental skill and use of Danish before entering school.

| Reading comprehension model | | $\beta$ | *SE* | *p* | $R^2$ | $\Delta R^2$ |
|---|---|---|---|---|---|---|
| Stage 1 | Type of bilingualism | 0.49 | 0.09 | 0.001 | 0.06 | |
| Stage 2 | Type of bilingualism | 0.31 | 0.10 | 0.003 | 0.10 | 0.04*** |
| | Maternal education | 0.14 | 0.04 | 0.001 | | |
| | Household income | 0.10 | 0.06 | 0.082 | | |
| Stage 3 | Type of bilingualism | 0.12 | 0.10 | 0.229 | 0.15 | 0.05*** |
| | Maternal education | 0.06 | 0.04 | 0.181 | | |
| | Household income | 0.04 | 0.06 | 0.427 | | |
| | Book exposure | 0.22 | 0.04 | 0.001 | | |
| | Literacy activities | 0.02 | 0.03 | 0.671 | | |
| Stage 4 | Type of bilingualism | 0.12 | 0.10 | 0.216 | 0.16 | 0.01 |
| | Maternal education | 0.06 | 0.04 | 0.195 | | |
| | Household income | 0.05 | 0.06 | 0.431 | | |
| | Book exposure | 0.20 | 0.05 | 0.001 | | |
| | Literacy activities | 0.01 | 0.04 | 0.748 | | |
| | Maternal Danish-language skills | −0.00 | 0.06 | 0.947 | | |
| | Maternal Danish-language use | 0.01 | 0.07 | 0.856 | | |
| | Paternal Danish-language skills | 0.13 | 0.06 | 0.031 | | |
| | Paternal Danish-language use | −0.13 | 0.07 | 0.062 | | |
| | Child's Danish-language use at home | 0.00 | 0.08 | 0.977 | | |
| | Child's Danish-language use in childcare | 0.02 | 0.08 | 0.788 | | |
| | Child's Danish-language use with friends | 0.04 | 0.07 | 0.605 | | |

***$p < 0.001$.

remains significant only for language comprehension. In other words, for decoding and reading comprehension in 2nd grade, Mixed bilingualism in itself does not give a significant advantage over Heritage bilingualism, but does so for language comprehension. The models suggest that the substantial, real world mean difference in 2nd grade outcomes between the two groups of bilinguals (see Table 2) is largely explained by SES, home literacy environments and, for language comprehension, language use patterns, rather than whether or not the children had access Danish-language exposure from a native parent in their home from the beginning of life. Note in this regard, however, that only the home literacy environment factor, book exposure, was systematically related to the three outcomes with statistical significance, pointing to this factor as a central predictor of later majority language and reading skills in bilingual children.

Turning to the SES variables, it is remarkable that neither maternal education nor household income was significantly associated with the outcomes when controlling for home literacy environments and children's language use and parental language use and skills (stage 4 model). In fact, SES relations to the two reading outcomes, decoding and reading comprehension, were nonsignificant already in the stage 3 models with the addition of home literacy environment factors. This suggests that especially book exposure (number of books, library visits, frequency of reading and reading from a young age) is an important factor underlying the often-seen differential outcomes in children of high vs. low SES parents.

## 4. Discussion

Our main question was whether degree of relative use of the heritage language and majority language in the home of preschool-age bilingual children and parental majority skills explain a significant amount of variance in their 2nd grade majority language and reading skills after controlling for type of bilingualism (Heritage vs. Mixed), family SES and home literacy environment quality. We found that the answer differs depending on the outcome. Relative use of the heritage language and the majority language, Danish, explained variance in 2nd grade Danish language comprehension scores; specifically, more use of Danish in the preschool years was a positive predictor of 2nd grade Danish language comprehension. On the other hand, relative language use did not explain variance in the two reading outcomes, decoding and reading comprehension in Danish. The relations between parent's and children's own language use and later outcomes were not significantly moderated by type of bilingualism (Mixed vs. Heritage) or by self-reported Danish-language parental skill. Controlling for covariates in a statistical model naturally does not undo real world differences such as those between Mixed vs. Heritage language bilingual children (corresponding approximately to simultaneous vs. sequential bilingual children in other research). However, we find it interesting and important that degree of majority language use is similarly related—or unrelated—to child language and reading outcomes in both groups of bilinguals.

Recall that the language comprehension measure was presented in written format and therefore also required basic reading skills. Therefore, one might argue that it is really a reading comprehension measure. However, the finding that home language use and skill measures explained variance in the language comprehension outcomes but not the two reading outcomes, indicates to us that the two tests do measure different skills.

The results are consistent previous research discussed in the introduction which found that parent's and children's relative use of the heritage and majority language is related to later language but not reading outcomes. Our finding that the relative language use in the preschool years did not explain variance in 2nd grade decoding and reading comprehension skills is extends the finding Winsler et al. (2014), who found that language use was not significantly related to early literacy skills in kindergarten. However, relative use of the heritage language and the Danish majority language in the preschool years did explain variance in 2nd grade Danish language comprehension skills. This result is consistent with those of Thordardottir (2019) namely that relative use of heritage and majority language was related to vocabulary size, that is, another type of oral language skill that than that examined in the present study.

Overall, the finding of a positive effect of parent's and children's own relative use of the majority and heritage language for 2nd grade language comprehension is consistent with a line of research that converges on the view that bilingual language proficiency is different than monolingual language proficiency in that each language develops in response to usage of each language (Ellis, 2002; Hernandez et al., 2005; MacWhinney, 2005), and that bilinguals should not be expected to perform as monolinguals in each of their languages (Grosjean, 1989). However, even though bilingual children may draw on bilingual resources, oral-language proficiency in the majority language used in school is necessary for successful educational outcomes (e.g., Demie and Strand, 2006; Halle et al., 2012). Our findings are also consistent with the view that reading skills should be little or at least less influenced by relative use of each language in bilinguals, because reading-related skills transfer better between languages than do oral language skills (Cummins, 1991; Adesope et al., 2010; Hammer et al., 2014).

Research question 2 and 3 asked whether relations of parental language use to child outcomes were moderated by type of bilingualism (Mixed vs. Heritage) or by parental majority language skill. The questions are in some sense related in that majority language skill is higher in the parents in Mixed bilingual families. Moderation analyses for both questions revealed nonsignificant interactions. This is a somewhat surprising result because it would be reasonable to suppose that majority language input is more helpful when the parent providing the input is a more proficient speaker. However, on this note, there were trends and sometimes just significant coefficients pointing to a *negative* influence of more paternal use of the majority language and a *positive* influence of higher paternal majority language skill (Tables 4–6). The positive influence makes immediate sense. However, we speculate that a negative influence of paternal majority could arise when fathers withhold richer heritage language input in order to—with the best of intentions—support majority language development in the child by speaking the majority language to the best of their abilities, even when not proficient. However, these results and their interpretation should be regarded with caution because the *p*-values for the relations are just above or just below 0.05. Additionally, the use and skill variables are based on parent's own report, which could be biased.

A minor, but potentially important finding is that the child's own majority language use with friends (outside of the home and outside childcare) was a significant positive predictor of language

comprehension (Table 4). We speculate that when immigrant children use the majority language with friends, this would often be native speakers of the majority language, who can be an additional rich source of majority-language input. Alternatively, or additionally, a high degree of majority language use with friends may be an indicator of a generally high degree of assimilation in the host country society, which could be associated with a favorable majority language development.

Finally, among the predictors of bilingual 2nd graders' language and reading outcomes in the present study, it is noteworthy that the home literacy factor book exposure was the only persistently significant predictor in models with multiple other predictors. Moreover, SES predictors of decoding and reading comprehension became nonsignificant when accounting for differences in home literacy environments (stage 3 of the models in Tables 5, 6). This suggests that an early start and a high frequency of book reading in early childhood is a highly supportive activity for language development and reading in school, irrespective of other factors such as type of bilingualism (Heritage or Mixed), SES and relative use of the heritage and majority language, and that differences in home literacy environments importantly account for the often-seen SES relationship to language development, which supports previous research indicating that typical SES measures are surface to underlying variables associated with SES (e.g., Singh et al., 2022).

## 4.1. Limitations and implications

The study had certain limitations worth noting. Scores for language use patterns in the home as well as home literacy environments are based on parent report rather than direct observation. This means that the scores could be influenced by social desirability, and their statistical relations to the outcomes could be underestimated. Importantly, we did not obtain measures or estimates of *absolute* language use with the children. That is, for example, a mother who speaks an equal amount of heritage and majority language to the child would have a score of 3 for language use (indicating 50/50 use) no matter whether she has very few or very many interactions with her child every day. In addition, although native speakers may vary in native language skill—especially bilinguals—the self-rating of Danish-language skills may be a conceptually different task for native and nonnative speakers. We did not obtain a measure of children's heritage language skills, which would have strengthened our argument that an important early base of later second-language and reading development, is a favorable early language learning environment *in general* rather than an early focus on second-language input. Likewise, we did not obtain measures of literacy skills in the heritage language. In addition, our measure of parent education is less reliable than measures of income, because the national register in Denmark only has reliable measures of education taken in Denmark (but recall that host country education has been found to be indicative of majority language skills, Hoff et al., 2018). It is also a limitation that our sample was biased towards higher SES than the general population of bilingual children in Denmark, as noted in section 2.1. Finally, since this is a longitudinal study, our first measures, those of the home literacy environment, were sampled quite a while ago, namely in 2013. Since then, the digital aspect of the home literacy environment has surely become more prominent, which means that our results with regard to home literacy environments may not generalize to present-day home literacy environments. Therefore, there is clearly a need for more research taking digital aspects of the home literacy environment into account. This new line of research may prove especially interesting and important with regard to bilingual children. This is because they often grow up in a context where children's books and printed literacy materials in the heritage language are not easily available, if available at all. However, the digital modality may offer a means to reduce this problem.

We would like to conclude by pointing out three important implications of our results. (1) 2nd grade majority language outcomes in the heritage bilingual children were substantially below the national means, and the degree of use and quality of the majority language in the home before school start explained part of the variance. This is not to say that parents who do not speak the majority language well should nevertheless speak it with their child; these parents can provide richer input in the heritage language (Hoff et al., 2020). However, it is important to ensure that bilingual children with little majority language exposure in the home are offered the opportunity to realize their potential for majority language acquisition, for example, in childcare or rather more informal majority language contexts such as playing with friends who are native speakers of the majority language.

(2) Reading development during bilingual children's early years of school does not seem to be significantly impacted by parent's and children's own relative use of the heritage language and majority language in the home during the preschool years. This suggests that an important foundation for bilingual children's reading skills later in school is a stimulating home literacy environment which starts them on a favorable language development trajectory from the very early years of life—independently of whether language use in the home leans more towards heritage language or majority language use. The implication of this is that language professionals should make clear to parents that they should interact with their bilingual children and stimulate their language development in whatever language it feels most natural to do so.

(3) A stimulating home literacy environment, notably an early start and a high frequency of shared book reading, is an important protective factor for reading development in bilingual children in majority-language schools.

## Data availability statement

The data analyzed in this study is subject to the following licenses/restrictions: The data resides in a repository in Statistics Denmark and cannot be exported. Interested researchers may be granted access to the data on the Statistics Denmark server upon request to Mette Vad Andersen. Requests to access these datasets should be directed to mvandersen@econ.au.dk.

## Ethics statement

Ethical review and approval was not required for the study on human participants in accordance with the local legislation and institutional requirements. Written informed consent to participate in this study was provided by the participants' legal guardian/next of kin.

## Author contributions

AH conceived the idea for this research, took part in data collection for the original RCTs contributing the data, carried out analyses, and wrote a draft of the article. DB was PI in the original RCTs and took part in data collection. For the present study she contributed analysis ideas, ideas for organizing the article, and commented and revised the draft. All authors contributed to the article and approved the submitted version.

## Funding

This research was supported by a grant to AH by the TrygFonden via TrygFonden's Center for Child Research (AU ID no. 31174).

## Acknowledgments

We thank all participating families for their contribution to this research. In addition we thank the editor and the reviewers for very helpful comments and suggestions.

## Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

## Publisher's note



## Supplementary material

The Supplementary material for this article can be found online at: https://www.frontiersin.org/articles/10.3389/fpsyg.2023.1134830/full#supplementary-material

## References

Adesope, O. O., Lavin, T., Thompson, T., and Ungerleider, C. (2010). A systematic review and meta-analysis of the cognitive correlates of bilingualism. *Rev. Educ. Res.* 80, 207–245. doi: 10.3102/0034654310368803

August, D., and Shanahan, T. (eds.). (2006). *Developing literacy in second-language learners: Report of the National Literacy Panel on language-minority children and youth*. Mahwah, NJ: Erlbaum.

Beuchert, L., and Nandrup, A. (2017). The Danish national tests at a glance.

Bleses, D., Højen, A., Dale, P. S., Justice, L. M., Dybdal, L., Piasta, S., et al. (2018a). Effective language and literacy instruction: evaluating the importance of scripting and group size components. *Early Child. Res. Q.* 42, 256–269. doi: 10.1016/j.ecresq.2017.10.002

Bleses, D., Højen, A., Justice, L. M., Dale, P. S., Dybdal, L., Piasta, S., et al. (2018b). The effectiveness of a large-scale language and preliteracy intervention: the SPELL randomized-controlled-trial in Denmark. *Child Dev.* 89, e342–e363. doi: 10.1111/cdev.12859

Bleses, D., Makransky, G., Dale, P. S., Højen, A., and Ari, B. A. (2016). Early productive vocabulary predicts academic achievement 10 years later. *Appl. Psycholinguist.* 37, 1461–1476. doi: 10.1017/S0142716416000060

Cummins, J. (1991). "Interdependence of first-and second-language proficiency in bilingual children" in *Language processing in bilingual children*. ed. E. Bialystok (Cambridge: Cambridge University Press)

Dale, P. S., Paul, A., Rosholm, M., and Bleses, D. (2023). Prediction from early childhood vocabulary to academic achievement at the end of compulsory schooling in Denmark. *Int. J. Behav. Dev.* 47, 123–134. doi: 10.1177/01650254221116878

Demie, F., and Strand, S. (2006). English language acquisition and educational attainment at the end of secondary school. *Educ. Stud.* 32, 215–231. doi: 10.1080/03055690600631119

Dustmann, C., Frattini, T., and Lanzara, G. (2012). Educational achievement of second-generation immigrants: an international comparison. *Econ. Policy* 27, 143–185. doi: 10.1111/j.1468-0327.2011.00275.x

Ellis, N. C. (2002). Frequency effects in language processing: a review with implications for theories of implicit and explicit language acquisition. *Stud. Second. Lang. Acquis.* 24, 143–188. doi: 10.1017/S0272263102002024

Foy, J. G., and Mann, V. (2003). Home literacy environment and phonological awareness in preschool children: differential effects for rhyme and phoneme awareness. *Appl. Psycholinguist.* 24, 59–88. doi: 10.1017/S0142716403000043

Giguere, D., and Hoff, E. (2023). Bilingual children's vocabulary skills at 5 years predict reading comprehension development within, not across, languages. *Int. J. Biling. Educ. Biling.*, 1–13. doi: 10.1080/13670050.2023.2166397

Ginsborg, J. (2006). The effects of socio-economic status on children's language acquisition and use. Language and social disadvantage: Theory into practice 9, 27.

Gonzalez, J. E., Taylor, A. B., McCormick, A. S., Villareal, V., Kim, M., Perez, E., et al. (2011). Exploring the underlying factor structure of the home literacy environment (HLE) in the English and Spanish versions of the Familia inventory: a cautionary tale. *Early Child. Res. Q.* 26, 475–483. doi: 10.1016/j.ecresq.2010.12.001

Grosjean, F. (1989). Neurolinguists, beware! The bilingual is not two monolinguals in one person. *Brain Lang.* 36, 3–15. doi: 10.1016/0093-934X(89)90048-5

Halle, T., Hair, E., Wandner, L., McNamara, M., and Chien, N. (2012). Predictors and outcomes of early versus later English language proficiency among English language learners. *Early Child. Res. Q.* 27, 1–20. doi: 10.1016/j.ecresq.2011.07.004

Hammer, C. S., Hoff, E., Uchikoshi, Y., Gillanders, C., Castro, D., and Sandilos, L. E. (2014). The language and literacy development of young dual language learners: a critical review. *Early Child. Res. Q.* 29, 715–733. doi: 10.1016/j.ecresq.2014.05.008

Hernandez, A., Li, P., and MacWhinney, B. (2005). The emergence of competing modules in bilingualism. *Trends Cogn. Sci.* 9, 220–225. doi: 10.1016/j.tics.2005.03.003

Hoff, E. (2018). Bilingual development in children of immigrant families. *Child Dev. Perspect.* 12, 80–86. doi: 10.1111/cdep.12262

Hoff, E., Burridge, A., Ribot, K. M., and Giguere, D. (2018). Language specificity in the relation of maternal education to bilingual children's vocabulary growth. *Dev. Psychol.* 54, 1011–1019. doi: 10.1037/dev0000492

Hoff, E., Core, C., and Shanks, K. F. (2020). The quality of child-directed speech depends on the speaker's language proficiency. *J. Child Lang.* 47, 132–145. doi: 10.1017/S030500091900028X

Hoff, E., Højen, A., and Bleses, D. (2022). "Social contexts and language development: Past, present, and future" in *Language development: Individual differences in a social context*. eds. J. Law, S. Reilly and C. McKean (Cambridge: Cambridge University Press)

Højen, A. (2019). "Improvement in young adults' second-language pronunciation after short-term immersion" in *A sound approach to language matters. In honor of Ocke-Schwen Bohn*. eds. A. M. Nyvad, M. Hejná, A. Højen, A. B. Jespersen and M. H. Sørensen (Aarhus, Denmark: Dept. of English, School of Communication & Culture: Aarhus University)

Højen, A., Bleses, D., Jensen, P., and Dale, P. S. (2019). Patterns of educational achievement among groups of immigrant children in Denmark emerge already in preschool second-language and preliteracy skills. *Appl. Psycholinguist.* 40, 853–875. doi: 10.1017/S0142716418000814

Højen, A., Hoff, E., Bleses, D., and Dale, P. S. (2021). The relation of home literacy environments to language and preliteracy skills in single-and dual-language children in Danish childcare. *Early Child. Res. Q.* 55, 312–325. doi: 10.1016/j.ecresq.2020.12.007

Højen, A., Schmidt, A. S. M., Møller, I. S., and Flansmose, L. (2022). Unequal home literacy environments between preschool-age boys and girls predict unequal language and preliteracy outcomes. *Acta Psychol.* 230:103716. doi: 10.1016/j.actpsy.2022.103716

Kieffer, M. J. (2008). Catching up or falling behind? Initial English proficiency, concentrated poverty, and the reading growth of language minority learners in the United States. *J. Educ. Psychol.* 100, 851–868. doi: 10.1037/0022-0663.100.4.851

MacWhinney, B. (2005). "A unified model of language acquisition," in *Handbook of bilingualism*, eds. J.F. Kroll and GrootA.M.B. De. Oxford: Oxford University Press, 49–67.

McBride-Chang, C., and Kail, R. V. (2002). Cross–cultural similarities in the predictors of Reading acquisition. *Child Dev.* 73, 1392–1407. doi: 10.1111/1467-8624.00479

Mesa, C., and Yeomans-Maldonado, G. (2019). The role of prekindergarten Spanish in predicting first-grade English word Reading among dual-language learners. *J. Speech Lang. Hear. Res.* 62, 1755–1774. doi: 10.1044/2019_JSLHR-L-17-0146

Rabiner, D. L., Godwin, J., and Dodge, K. A. (2016). Predicting academic achievement and attainment: the contribution of early academic skills, attention difficulties, and social competence. *Sch. Psychol. Rev.* 45, 250–267. doi: 10.17105/SPR45-2.250-267

Rowe, M. L., Denmark, N., Harden, B. J., and Stapleton, L. M. (2016). The role of parent education and parenting knowledge in children's language and literacy skills among White, Black, and Latino families. *Infant Child Dev.* 25, 198–220. doi: 10.1002/icd.1924

Segers, E., and Kleemans, T. (2020). The impact of the digital home environment on kindergartners' language and early literacy. *Front. Psychol.* 11:538584. doi: 10.3389/fpsyg.2020.538584

Sénéchal, M., and LeFevre, J.-A. (2014). Continuity and change in the home literacy environment as predictors of growth in vocabulary and reading. *Child Dev.* 85, 1552–1568. doi: 10.1111/cdev.12222

Sénéchal, M., Lefevre, J.-A., Thomas, E. M., and Daley, K. E. (1998). Differential effects of home literacy experiences on the development of oral and written language. *Read. Res. Q.* 33, 96–116. doi: 10.1598/RRQ.33.1.5

Singh, L., Yeung, W.-J.J., Cheng, Q., and Heng, E.Y.T. (2022). The home literacy environment mediates effects of socio-economic status on infant vocabulary development. *Dev. Sci.*,:e13349. doi: 10.1111/desc.13349 [Epub ahead of print].

Snow, C.E., Burns, M.S., and Griffin, P. (1998). *Preventing reading difficulties in young children committee on the prevention of reading difficulties in young children*. Washington, DC: National Research Council.

Sullivan, A., Moulton, V., and Fitzsimons, E. (2021). The intergenerational transmission of language skill. *Br. J. Sociol.* 72, 207–232. doi: 10.1111/1468-4446.12780

Thordardottir, E. (2019). Amount trumps timing in bilingual vocabulary acquisition: effects of input in simultaneous and sequential school-age bilinguals. *Int. J. Biling.* 23, 236–255. doi: 10.1177/1367006917722418

Turco, R. G., Lesaux, N. K., and Jones, S. M. (2023). Home literacy in the digital era: the role of mobile screen media frequency in a U.S. state. *Br. J. Educ. Technol.* 54, 513–533. doi: 10.1111/bjet.13259

Umbel, V. M., and Oller, D. K. (1994). Developmental changes in receptive vocabulary in Hispanic bilingual school children. *Lang. Learn.* 44, 221–242. doi: 10.1111/j.1467-1770.1994.tb01101.x

van Bergen, E., van Zuijen, T., Bishop, D., and de Jong, P. F. (2017). Why are home literacy environment and children's reading skills associated? What parental skills reveal. *Read. Res. Q.* 52, 147–160. doi: 10.1002/rrq.160

White, K. R. (1982). The relation between socioeconomic status and academic achievement. *Psychol. Bull.* 91, 461–481. doi: 10.1037/0033-2909.91.3.461

Whitehurst, G. J., and Lonigan, C. J. (1998). Child development and emergent literacy. *Child Dev.* 69, 848–872. doi: 10.1111/j.1467-8624.1998.tb06247.x

Winsler, A., Burchinal, M. R., Tien, H.-C., Peisner-Feinberg, E., Espinosa, L., Castro, D. C., et al. (2014). Early development among dual language learners: the roles of language use at home, maternal immigration, country of origin, and socio-demographic variables. *Early Child. Res. Q.* 29, 750–764. doi: 10.1016/j.ecresq.2014.02.008

Zauche, L. H., Thul, T. A., Mahoney, A. E. D., and Stapel-Wax, J. L. (2016). Influence of language nutrition on children's language and cognitive development: an integrated review. *Early Child. Res. Q.* 36, 318–333. doi: 10.1016/j.ecresq.2016.01.015

frontiers | Frontiers in Psychology

TYPE Original Research
PUBLISHED 31 May 2023
DOI 10.3389/fpsyg.2023.1125131



OPEN ACCESS

EDITED BY
Vicky Chondrogianni,
The University of Edinburgh, United Kingdom

REVIEWED BY
Casey Taliancich-Klinger,
The University of Texas Health Science Center at San Antonio, United States
Sveta Fichman,
Hadassah Academic College, Israel

*CORRESPONDENCE
Maria Adelaida Restrepo
✉ marestrepo@usf.edu

†These authors have contributed equally to this work

RECEIVED 15 December 2022
ACCEPTED 02 May 2023
PUBLISHED 31 May 2023

CITATION
Martinez-Nieto L, Moen T, Pierce M and Restrepo MA (2023) The use of mazes over time in Spanish heritage speakers in the US. *Front. Psychol.* 14:1125131. doi: 10.3389/fpsyg.2023.1125131



# The use of mazes over time in Spanish heritage speakers in the US

Lourdes Martinez-Nieto[1†], Theresa Moen[2†], Melissa Pierce[3†] and Maria Adelaida Restrepo[4*†]

[1]Department of Audiology and Speech-Language Pathology, A.T. Still University, Mesa, AZ, United States, [2]Speech and Hearing Science, Arizona State University, Tempe, AZ, United States, [3]Department of Speech-Language Pathology, Midwestern University, Glendale, AZ, United States, [4]Department of Communication Sciences and Disorders, University of South Florida, Tampa, FL, United States

**Introduction:** Mazes are linguistic disfluencies such as filled pauses, repetitions, or revisions of grammatical, phonological, or lexical aspects of words that do not contribute to the meaning of a sentence. Bilingual children are believed to increase the numbers of mazes in their native or heritage language, the minority language, as they become more proficient in the second language, the societal language. Mazes may increase over time in bilingual Spanish-speaking children as they become more proficient in English, the societal language in the United States. However, current studies have not been conducted longitudinally. Higher rates of mazes in the heritage language over time may be due to changes in language proficiency and differences in processing demands in the children as they use more complex language. Moreover, children with developmental language disorder (DLD) can also present higher rates of mazes than children with typical language. Heritage speakers, therefore, are at risk of being misdiagnosed with DLD due to high rates of mazes. Currently, we do not understand what the typical rates of mazes are as heritage speakers get older and become more proficient in the societal language. The current study examined the type and frequency of Spanish mazes longitudinally in a group of 22 Spanish heritage speakers with and without DLD and determined the changes over time.

**Methods:** A total of 11 children with typical language development (TLD) and 11 with DLD participated in this 5-year longitudinal study. Using a wordless picture book, children completed a retelling task in Spanish during the spring of each academic year (PK to 3rd grade) as part of a 5-h testing battery. Narratives were transcribed and coded for types of mazes (filled pauses, repetitions, grammatical revisions, phonological revisions, and lexical revisions).

**Results and conclusion:** The results of the study indicate that TLD children increased their overall percentage of mazed words and utterances. The opposite pattern was observed in the DLD group, which decreased their percentage of mazed words and utterances. In contrast, both groups demonstrated a decrease in repetitions in first grade and an increase in third grade. Additionally, the TLD

and DLD children decreased in the percentage of fillers in first grade and then increased in the third grade. Results suggest that maze use is quite variable in heritage speakers and does not necessarily differentiate groups. Clinicians should not rely solely on mazes to determine ability status. In fact, high use of mazes can reflect typical language development.

KEYWORDS

**heritage speakers, Spanish in the U.S., bilingual, developmental language disorder (DLD), longitudinal, mazes**

## Introduction

Heritage speakers (HS) are bilinguals who are native speakers of a minority language (the home/heritage language) that was naturalistically acquired at home and who also speak the societally dominant language where they live (Montrul, 2016; Kupisch and Rothman, 2018). In our study, we focus on children who speak Spanish as the minority and heritage language within an English-speaking societal context. As of 2019, approximately 12 million children were considered HS in the US, with that number expected to grow. Of these, almost 75% speak Spanish as their home language (U.S. Census Bureau, 2016). Many HS children start their formal education as primarily Spanish speakers but rapidly switch to English dominance and Spanish becomes the Heritage Language.

Research on HS adults has reported that their grammar and fluency in the heritage language (HL) differ from those of monolinguals (Valdés, 2005; Montrul, 2016) and may resemble that of second language speakers (Bruhn de Garavito and White, 2002; O'Grady et al., 2011). Additionally, the linguistic characteristics of HS children in the HL may overlap with the linguistic profile of monolingual children of the same language with Developmental Language Disorder (DLD, formerly called specific language impairment or primary language impairment), resulting in HS children with a misdiagnosis of DLD. Understanding the development of maze use and characteristics over the course of HS' language development and second language acquisition is critical for improving our knowledge and practices in evaluating HS with suspected DLD. In the current study, we examine the changes in Spanish maze use over time, given the limited research documenting how these characteristics change and impact children's HL use. As children become more proficient in English, Spanish assessment is still critical as part of the whole child's repertoire and informs accurate diagnosis.

Monolingual children with DLD exhibit significant morphosyntactic differences from children with typical language development (TLD) (Leonard, 2014). However, these differences are less clear in the case of bilingual children. Bilinguals' linguistic characteristics often differ in fluency and morphology from monolingual speakers in the HL, which may be due to language attrition, protracted development or different developmental patterns (Morgan et al., 2013; Martinez-Nieto and Restrepo, 2021). At the same time, HS may show influences of typical second language development in English, the societal language (Paradis, 2005), as English development may be influenced by the children's first language, Spanish. To identify the expected language characteristics of bilingual children with DLD, researchers have compared grammatical skills (Morgan et al., 2013), narrative skills (Tsimpli et al., 2016), and code-switching patterns (Gutiérrez-Clellen et al., 2009) between bilingual children with DLD and TLD. Oral language fluency, however, has received less attention in the literature, and the limited research available does not indicate clear and conclusive patterns in the use of mazes as children acquire a second language over time. Oral language fluency, in this text, refers to the linguistic flow in the children's productions and encompasses typical disfluencies such as repetitions, revisions, and filled pauses. In addition, as children develop more proficiency in their second language and have fewer opportunities in the native language, they may present with high rates of maze use.

Some researchers have reported that an increased rate of mazes in monolingual children should be considered an indicator of DLD (Leadholm and Miller, 1995; Thordardottir and Ellis Weismer, 2002; Guo et al., 2008). However, increases in language complexity correlate with an increase in mazes (MacLachlan and Chapman, 1988; Rispoli and Hadley, 2001; Carias and Ingram, 2006) and are therefore expected as children's language naturally develops and becomes more complex. These ambiguities and the limited extant research make typical or linguistic-based disfluencies, specifically mazes, an important area of research for helping to differentiate DLD from TLD in young HS.

## Mazes

Mazes are linguistic non-fluencies, such as fragments of word(s) that are not part of the intended message (Loban, 1976; Levelt, 1989). Studies have varied on the terms used to refer to mazes (revisions, interruptions, speech disfluencies, circumlocutions, hesitations, communication breakdowns, and self-corrections). In the present study, we will refer to them as mazes. Mazes are typically grouped into types such as filled pauses, repetitions, and revisions (phonological, lexical and grammatical–DeJoy and Gregory, 1985; Dollaghan and Campbell, 1992; Bedore et al., 2006). These maze types typically fall into two overarching categories: fillers (filled pauses and repetitions) or content (grammatical, lexical, and phonological revisions) mazes. According to Thordardottir and Ellis Weismer (2002), speakers use repetitions or filled pauses as a pragmatic function and do not change the intended meaning of the utterance, while revisions (phonological, grammatical, or lexical) may be part of processing demands and alter the meaning of the sentence. Rispoli (2003) and Rispoli et al. (2008) propose an

explanation for the difference between fillers (stalls) and content (revisions) mazes. They state that stalls/fillers are due to glitches that are temporary problems while encoding the message. On the other hand, they attribute revisions to a self-monitoring process. While stalls allow the speaker to wait for the following encoding processes, revisions work as a way to compare the intended message to the actual linguistic output. This is an important distinction because revisions may be considered indicators of grammatical knowledge.

Mazes are present in typical language development in all languages, and all speakers produce mazes from childhood through adulthood. Research has reported that maze frequency correlates with linguistic and grammatical complexity. For example, higher rates of mazes are observed when sentence length increases (MacLachlan and Chapman, 1988; Rispoli and Hadley, 2001; Carias and Ingram, 2006) and when grammatical skills increase (Rispoli, 2003). Mazes are more common in narration, a more complex task, than in conversation (Leadholm and Miller, 1995; Bedore et al., 2006; Wetherell et al., 2007). For example, Rispoli and Hadley (2001) investigated how sentence complexity may determine maze production. They examined maze production in a group of 26 TLD children (ages 2; 6 to 4). The results showed that children had more mazes in longer and more complex sentences. More recently, Rispoli (2018) reported that when 27-month-old children used a more diverse set of sentence subjects during play interaction with their mothers, they also used more revisions.

Maze rates are also correlated with age and language proficiency. For example, in typically developing children, mazes are expected to decrease with age as a sign of language maturity and better proficiency (MacLachlan and Chapman, 1988; Rispoli and Hadley, 2001; Carias and Ingram, 2006). Consistent with this expectation, Loban (1976) reported lower rates of mazes in a group of 35 English-speaking children who were considered effective or proficient language users. However, if children show formulation problems and do not attempt to reformulate or repair them, it may indicate processing difficulties (Kaur et al., 2011).

## Maze production in heritage speakers

Heritage speakers' maze rates and types may be different across their two languages (Bedore et al., 2006; Byrd, 2018). The nature of bilingual acquisition imposes different processing demands for each language in bilingual children depending on their proficiency in the language they are using, which is not static and changes dynamically throughout their development. These differences in processing demands may manifest in the use of mazes.

In adult bilingual speakers, mazes are more frequent in the second language than in the native language when the native language is dominant (Rieger, 2003). Studies show that all bilingual and monolingual children produce mazes within narrative contexts, providing valuable information within a naturalistic, functional task with a processing demand over and above that of conversation (Fiestas et al., 2005; Bedore et al., 2006; Taliancich-Klinger and Bedore, 2019).

Research with typically developing Spanish-English bilingual children in the early school years found no significant differences in overall maze production within narrative contexts between monolingual and bilingual children in English or Spanish, suggesting that their maze use was not related to bilingualism (Fiestas et al., 2005; Bedore et al., 2006; Taliancich-Klinger and Bedore, 2019). As mentioned, these studies have focused on comparing young HSs' maze production with that of their monolingual peers in English and Spanish. Therefore, there is a need to examine longitudinal changes in young HS' maze production in the HL, which will contribute to our understanding of children's maze use patterns over time and how typical HS language differs from those with DLD.

## Mazes and developmental language disorder

Research with monolingual Spanish-speaking children with DLD shows that they have greater rates of mazes than TLD children and that the types of mazes they use include more diverse linguistic elements. Jackson-Maldonado et al. (2013) conducted a study with 10 children (5 TLD and 5 DLD) monolingual Spanish-speaking children (5–9 years of age). They found that in a narrative retelling task, TLD children used mainly lexical mazes with nouns [e.g., (*la ra*) Irvin aventó a la rana* "(the fro*) Irvin threw the frog"], while DLD children used repetitions and grammatical mazes related to clitics, prepositions, and determiners [e.g., *para va a picarle (una)la Ø(s)abejas "to go to sting him (a) the bees"],* all of which are vulnerable and prone to errors for this group. Research on mazes in HS is limited, and development patterns through the years will not necessarily reflect those described above. Research in this area is still very limited cross-linguistically and with bilingual populations.

In English-speaking children, researchers have found similar results as reported above, within sentence contexts (Boscolo et al., 2002; Finneran et al., 2009), narrative contexts (MacLachlan and Chapman, 1988; Thordardottir and Ellis Weismer, 2002; Guo et al., 2008), and conversational contexts (MacLachlan and Chapman, 1988). However, findings are equivocal regarding the maze types used among the different ability groups. For example, MacLachlan and Chapman (1988) found no difference in the types of mazes produced by 9–11 year-old TLD children and those with DLD, while Finneran et al. (2009) found that 8-year-old children with DLD produced significantly more repetitions than their TLD peers. Moreover, Boscolo et al. (2002) found that, on average, 9-year-old children with previous diagnoses of DLD produced more whole-word and phrase repetitions, revisions, and filled pauses and significantly more part-word repetitions than their TLD peers. Hodge et al. (1999) found that toddlers with DLD produced significantly more part-word and whole-word repetitions than their TLD peers. In contrast, two studies have shown that children with DLD actually produce the same or fewer mazes compared to their TLD peers. Merits-Patterson and Reed (1981) found no difference in quantity or type of mazes between TLD and DLD preschoolers not receiving treatment. Meanwhile, Thordardottir and Ellis Weismer (2002) found that children with DLD actually used fewer filled pauses than the TLD children.

There are few studies on maze production in general, and even fewer involving HS school-aged children (Fiestas et al., 2005;

Bedore et al., 2006; Carias and Ingram, 2006; Kaur et al., 2011; Taliancich-Klinger et al., 2013, 2021; Byrd et al., 2015; Taliancich-Klinger and Bedore, 2019; Rojas and Irani, 2020). No studies to date, as far as we know, have examined maze production longitudinally in young HS with TLD and DLD. Therefore, the present study will help us better understand what typical maze use development looks like in young HSs as they increase their second language proficiency over time. Specifically, we test the hypothesis that as children increase their second language proficiency, the percentage of mazes in the HL increases. The present study aims to contribute to the knowledge base regarding Spanish HS development and the use of mazes in the United States' English-speaking societal context. In addition, this study will contribute to our understanding of how to differentiate TLD from DLD in Spanish as a heritage language.

## The current study

This study aimed to examine the overall use of mazes and the type and frequency of mazes longitudinally in a group of Spanish-HS with and without DLD during preschool, first, and third grade. Due to the assumption that mazes in Spanish, the heritage language (HL), increase as English proficiency improves, we focused on the following research questions:

(1) What is the overall amount of maze production in Spanish per language ability group (HS-DLD/HS-TLD) and grade (Pre-K, 1st, 3rd), and are there differences between groups and grade?

- We hypothesize that the number of mazes produced will be higher overall for children with DLD. Further, we hypothesize that the mazes will decrease over time for the HS-TLD group, but be stable or increase by grade for the HS-DLD group.

(2) What specific types of mazes (i.e., revisions, repetitions, etc.) do Spanish-HS produce in Spanish over time?

- We hypothesize that filler mazes, such as filled pauses and repetitions, will be more common than content mazes, such as revisions, for both groups.

(3) As children increase proficiency in English, are there differences in the frequency and types of mazes used in Spanish by grade and by ability group (HS-DLD/HS-TLD)?

- We hypothesize that as children increase English proficiency, their maze use in Spanish will increase or remain consistent for HS-DLD children and that it will reduce over time for HS-TLD children. We also predict that differences will arise in content vs. filler mazes, with content used more frequently by the TLD group and filler used more frequently by the DLD group.

## Materials and methods

### Participants

Participants in this study are part of the Language and Reading Research Consortium (LARRC) study, which had two samples of children, one Spanish-English bilingual and one English monolingual. The current study addresses the language of twenty-two participants from the 285 bilingual children that started in PreK and spoke Spanish at home. The sample consisted of 11 Spanish-speaking children with TLD and 11 Spanish-speaking children with DLD who were recruited in preschool and followed through third grade. Measures for qualification in this study included the *Clinical Evaluation of Language Fundamentals*- Preschool, 2nd Edition–Spanish (CELF-P2 Spanish), a norm-referenced standardized measure with bilingual children in the US (Wiig et al., 2009). This measure includes four core subtests that assess grammar, morphology, and semantics. In addition, we used the Spanish Screener for Language Impairment in Children (SSLIC, Restrepo et al., 2010). This measure provides a subtest in morphology, sentence repetition and non-word repetition, developed and standardized with over 650 bilingual children in the greater Phoenix area. All participants met the following inclusionary criteria: (a) parents reported that their child spoke Spanish as their native language at home at least 50% of the time; (b) parents and teachers reported the child spoke more Spanish than English; (c) child had no severe speech, language, cognitive, sensory, or motor disabilities that would preclude participation in assessments per parent and teacher report; (d) child was attending preschool, and was eligible to enter kindergarten the following year.

Children were screened in Spanish in PreK when they spoke mostly Spanish. In subsequent years they were evaluated in both languages. Children with DLD were identified in Pre-Kindergarten using (a) the CELF-P2 Spanish by scoring below 7 on the word structure and recalling sentences subtests; (b) scoring below 11 (out of a possible 44) on the SSLIC measure; (c) parents reported language concerns; and (d) whether they were receiving language services. All children were followed for 5 years. Children's schooling in kindergarten through 3rd grade was in English only due to Arizona state laws at the time of the study (AZ Proposition 203, passed in 2000). Bilingual children in our study were in such English-only classrooms through elementary school. Therefore, exposure to Spanish only occurred outside the school.

For inclusion in our analyses, we randomly selected the TLD children from those in the database with the most complete data for the 3 years under study (Pre-K, 1st, and 3rd grades). Inclusion criteria for HS children with DLD required complete data. In cases of code-switching, we required transcripts to have at least 10 sentences in Spanish to be considered complete data for each time point. Participants' demographics are shown in **Table 1**.

### Materials

As part of the larger study, children participated in a 5-h battery that included oral language and literacy measures. The sessions consisted of 45 min to an hour and a half, depending on the grade and the child's attention, with breaks during this time if needed. The language samples included one of the Mercer Mayer frog wordless picture books: *Frog on his own* and *A boy a dog a frog and a friend* (Mayer, 1967, 1973). The Spanish samples came from retelling one of the two Spanish frog stories with a Spanish tester. We used a story script that we created for each story, controlling for length and lexical diversity to be equivalent across the wordless books used in the longitudinal study. The examiner

TABLE 1 Participants demographic Information.

| | TLD | DLD |
|---|---|---|
| Total | 11 | 11 |
| Female | 5 | 4 |
| Male | 6 | 7 |
| Age in months at PK (Mean) | 59 | 59 |
| Word structure$^{+**}$ (Mean) | 9 | 4.1 |
| Recalling sentences$^{+**}$ (Mean) | 9.5 | 5.8 |
| SSLIC*/** (Mean) | 25 | 5 |
| Language services | None | All |

$^{+}$Scaled scores from the clinical evaluation of language fundamentals-2 (Spanish) $^{**}p < 0.001$.
*Raw score from SSLIC-screener for Spanish speaking children.

read the story out loud to the child, and then the child retold the story as they went page by page. Retelling was used because we started the protocol in preschool when many children may not have experience telling stories, and we wanted to maintain a consistent protocol year to year. The stories alternated between the two books from year to year. So, every other year, the child retold the same story. The stories also changed by language. A native speaker of the language assessed children in only one language per day. If a child was seen twice in 1 day for some exceptional reason, different assessors evaluated the child in the different languages.

## Procedures

Using a wordless picture book, children completed a Spanish oral narrative retelling task during the spring of each academic year (PK to 3rd grade) as part of a 5-h testing battery for the larger study. Narratives were transcribed and coded for types of mazes. Specifically, the mazes were coded as follows: Filled pauses, which are non-linguistic vocalizations [e.g., *el niño (uhm) vio a la (uhm) rana* "the boy (uhm) saw the (uhm) frog"]; repetitions, which are part-word, whole word, or phrases that the speaker repeats with no additional meaning [e.g., (*el*) *el perro se fue* "(the) the dog went away"]. Revisions were categorized into lexical, phonological and grammatical. Lexical revisions involve changes of the word choice (e.g., *el sapo/la rana se fue*–the toad/the frog left), lexical revision with code-switching involved changes of the word choice with a change in language [e.g., (*el* dog) *el perro se fue*–"the dog went away"], phonological revisions are the correction of sounds of the word [e.g., *el perro se fue (tras) atras* "the dog went (bek) behind"] and grammatical revision involved changes in the grammatical structure of the sentence, such as gender agreement, subject-verb agreement, or word order (*el rana/la rana se fue* "the frog left"–masculine to feminine article). We analyzed the samples using the Systematic Analysis of Language Transcripts software- research version 20 (SALT; Miller and Iglesias, 2020). The percentage of specific maze types was calculated based on the total number of mazes produced by the child in the whole sample. If the child produced a total of 20 mazes in the narrative and 10 were repetitions, repetitions represented 50% of the total number of mazes. The same procedure was used for each type of maze. The percentage of mazed utterances per sample was calculated by including any utterance with at least one maze. The denominator was the total number of utterances in the narrative. This was used rather than the total number of mazed utterances because samples varied in length, allowing us to consider the more comparable proportion of mazes in each sample. In addition to the summary codes described above, we obtained measures of mean length of utterance, number of different words, percent of ungrammatical sentences, total number of sentences and number of mazed sentences.

## Analyses

Typically, group differences over time are evaluated using analysis of variance (ANOVA). For this study, a Linear Mixed Model (LMM) was chosen for several reasons. First, this method of analysis accounts better for the small sample size by including individual participants as random effects, thus retaining more statistical power. LMM also deals better with non-independent samples by explicitly accommodating dependency between observations from the same participant (Breslow and Clayton, 1993; Krueger and Tian, 2004; Aarts et al., 2014). LMM maximizes power by using the data in the long form and handles missing data using maximum likelihood estimation rather than list-wise deletion, thus retaining more student outcomes at each time point (Krueger and Tian, 2004). Additionally, it allows us to consider fixed factors, which are sampled from the population, and random effects, which are associated with individual experimental units randomly drawn from the population (Gelman and Hill, 2007; Magezi, 2015). SPSS Version 28 was used for all analyses. Results are reported as $F$ statistics, significance (set at $p < 0.05$), and partial eta squared effect sizes (Cohen et al., 2002). The fixed factors were the grade (Preschool, 1st or 3rd) and group (TLD vs. DLD). Individual students were treated as random factors. A Bonferroni correction was applied to each LMM to adjust for multiple comparisons.

# Results

To answer the first research question of the changes in the use of overall mazes over time by group, we examined differences in the overall percentage and types of mazes used by bilingual Spanish HS children with and without DLD who were attending English-only schooling. Descriptive statistics for oral language production measures, such as MLU, are found in **Table 2**. These measures are reported to give context to the specific maze production results and show overall language development trajectories. Additionally, descriptives on the maze types are included in **Table 3** as the percent of total mazes.

To answer research question one: "What is the percent of mazed utterances used over time by children with TLD and DLD?" LMM results showed a significant main effect of grade with a medium effect size [$F(2,274.61) = 11.42$, $p < 0.001$, $\eta^2 = 0.07$], but not group membership [$F(1,17.08) = 1.02$, $p = 0.33$, $\eta^2 = 0.06$], though

TABLE 2 Oral language production descriptive statistics [Mean (SD)].

| | PK | | 1st grade | | 3rd grade | |
|---|---|---|---|---|---|---|
| | HS-TLD | HS-DLD | HS-TLD | HS-DLD | HS-TLD | HS-DLD |
| TNW | 128.8 (52.6) | 98.3 (49.8) | 233.8 (74.5) | 197.8 (90.5) | 325.5 (89.9) | 268.5 (127.5) |
| MLU | 5.2 (1.1) | 4.4 (1.3) | 7.3 (0.9) | 6.6 (1.1) | 8.1 (0.8) | 7.4 (1.0) |
| NDW | 55.4 (18.4) | 40.1 (13.2) | 77.0 (17.4) | 70.6 (17.7) | 92.3 (18.3) | 73.3 (31.2) |
| Maze words (%) | 13.9 (4.8) | 23.3 (9.5) | 16.4 (7.0) | 17.2 (8.3) | 16.0 (7.1) | 13.4 (6.7) |
| Total utterances | 24.2 (9.6) | 21.1 (9.4) | 31.6 (10.0) | 31.0 (13.8) | 41.1 (12.3) | 36.0 (17.0) |
| Mazed utterances (%) | 41.0 (12.0) | 56.0 (17.0) | 52.0 (18.0) | 48.0 (16.0) | 58.0 (23.0) | 44.0 (26.0) |

TNW, total number of words; MLU, mean length of utterance -words; NDW, number of different words; CS, code-switching.

TABLE 3 Percentage of maze production by type descriptive statistics [Mean (SD)].

| | PK | | 1st grade | | 3rd grade | |
|---|---|---|---|---|---|---|
| | HS-TLD | HS-DLD | HS-TLD | HS-DLD | HS-TLD | HS-DLD |
| Filled pauses | 23.9 (21.0) | 16.7 (15.4) | 19.6 (22.9) | 20.7 (21.8) | 16.0 (16.8) | 19.9 (15.8) |
| Repetitions | 53.5 (19.5) | 63.1 (20.6) | 43.7 (20.9) | 43.0 (11.8) | 51.0 (12.6) | 57.2 (19.2) |
| Grammatical revisions | 11.3 (9.5) | 11.2 (11.6) | 16.6 (12.2) | 12.4 (14.3) | 14.5 (8.8) | 9.7 (11.2) |
| Phonological revisions | 0.4 (1.4) | 0.0 | 0.3 (0.9) | 0.8 (2.0) | 0.0 | 0.0 |
| Lexical revisions | 10.9 (10.1) | 7.9 (9.8) | 19.5 (10.1) | 21.1 (13.1) | 18.4 (14.0) | 13.3 (4.2) |
| Lexical revisions w/CS | 0.0 | 1.1 (3.2) | 0.3 (0.9) | 2.0 (2.7) | 0.1 (0.4) | 0.0 |
| Content mazes | 22.6 (10.5) | 20.2 (11.1) | 36.7 (15.2) | 36.3 (17.8) | 33.1 (16.8) | 22.9 (6.8) |
| Filler mazes | 77.4 (10.5) | 79.8 (11.1) | 63.3 (15.2) | 63.7 (17.8) | 66.9 (16.8) | 77.1 (6.8) |

Percentages are based on the total number of mazes. Content mazes = all revision types; Filler mazes = repetitions and filled pauses.

group membership did show a medium effect size (≥0.06; Cohen et al., 2002). A significant grade-by-group interaction effect was also observed, with a large effect size [$F(2,274.61) = 33.94$, $p < 0.001$, $\eta^2 = 0.20$] (≥0.14; Cohen et al., 2002). Further probes of mean differences revealed that overall, maze use significantly increased for HS-TLD children from preschool to first grade, followed by a non-significant decrease from first to third grade. Table 4 displays mean differences in the percentage of mazes used within groups across years of the study for each individual type of maze, and for the two maze categories (fillers and content). These means are derived from the averaged random effects across subjects. Overall percentage of mazed utterances decreased significantly across the grades for HS-DLD.

To answer research questions two and three about the types of mazes that HS use over time and if there are differences between HS-TLD and HS-DLD in the types of mazes used, we analyzed the maze types individually using an LMM for each type. For filled pauses, grade [$F(2,275.29) = 0.32$, $p = 0.73$ $\eta^2$, $= 0.002$] and group [$F(1,16.82) = 0.13$, $p = 0.72$, $\eta^2 = 0.01$] effects were not significant and showed small effect sizes (<0.06; Cohen et al., 2002). Nonetheless, a significant grade-by-group interaction effect was observed with a medium effect size [$F(2,275.29) = 11.35$, $p < 0.001$, $\eta^2 = 0.08$]. Based on further analysis of mean differences, this effect was driven by group differences between first and third grade, with the HS- DLD group increasing their use of filled pauses while the HS-TLD group decreased their use (Table 4). A visual representation is shown in Figure 1.

Analysis of the use of repetitions also revealed significant differences by year [$F(2,273.90) = 29.74$, $p < 0.001$, $\eta^2 = 0.18$] and a year by group interaction [$F(2,273.90) = 5.96$, $p < 0.05$, $\eta^2 = 0.04$], with large and small effect sizes, respectively. Upon probing mean differences, the interaction appears driven by both groups' reduced use of repetition between preschool and first grade, followed by increased use between first and third grade (see Table 4). A visual representation is shown in Figure 2.

Analysis of grammatical revisions showed a significant main effect for grade with a small effect size [$F(2,277.05) = 3.19$, $p = 0.04$, $\eta^2 = 0.02$]; however, group differences were not significant, nor was there a group by grade interaction effect. A significant increase in the use of grammatical revisions by the HS-TLD group between preschool and first grade appeared to drive the main effect for grade (see Table 4). A visual representation is shown in Figure 3.

Analysis of phonological revisions showed significant differences by grade [$F(2,276.09) = 5.82$, $p = 0.003$, $\eta^2 = 0.04$], and a group by grade interaction effect [$F(2,276.09) = 8.47$, $p < 0.001$, $\eta^2 = 0.06$], with small and medium effect sizes, respectively. Further examination of mean differences showed that children in the HS-DLD group significantly increased their use of phonological revisions between preschool and first grade, while those in the HS-TLD group significantly decreased their use between first grade and third grade (Table 4). Despite these significant main effects, phonological revisions represented a very small proportion of overall mazes used by both groups in all grades. Due to the small proportion, a visual representation is not provided.

Analysis of lexical revisions showed a significant grade [$F(2,278.22) = 38.46$, $p < 0.001$, $\eta^2 = 0.22$] and group-by-grade interaction [$F(2,278.22) = 4.40$, $p = 0.01$, $\eta^2 = 0.03$] with large and small effect sizes, respectively. Group differences were not

10.3389/fpsyg.2023.1125131

TABLE 4 Mean differences in percentage of mazes across samples by year.

| | Pre-K to 1st | | 1st to 3rd | | Pre-K to 3rd | |
|---|---|---|---|---|---|---|
| | HS-TLD | HS-DLD | HS-TLD | HS-DLD | HS-TLD | HS-DLD |
| Overall maze production | 0.03* | −0.06* | −0.004 | −0.04* | 0.02 | −0.10* |
| SE | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 |
| 95% CI | 0.004 −0.05 | −0.09 to −0.04 | −0.03 −0.02 | −0.07 to −0.003 | −0.002 −0.05 | −0.13 to −0.07 |
| Filled pauses | −4.26 | 1.09 | −7.67* | 10.10* | −11.94* | 11.19* |
| SE | 2.54 | 3.14 | 2.87 | 4.17 | 2.87 | 3.94 |
| 95% CI | −10.39 to 1.86 | −6.47 to 8.64 | −14.58 to −0.77 | 0.07–20.14 | −18.85 to −5.03 | 1.70–20.69 |
| Repetitions | −9.81* | −15.92* | 9.91* | 2.28 | 0.10 | −13.64* |
| SE | 2.11 | 2.60 | 2.38 | 3.47 | 2.38 | 3.27 |
| 95% CI | −14.88 to −4.74 | −22.18 to −9.65 | 4.18–15.63 | −6.07 to 10.62 | −5.63 to 5.82 | −21.53 to −5.75 |
| Grammatical revisions | 5.35* | 0.67 | −2.35 | −1.87 | 3.00 | −1.20 |
| SE | 1.51 | 1.87 | 1.71 | 2.47 | 1.71 | 2.34 |
| 95% CI | 1.70 –8.99 | −3.81 to 5.17 | −6.46 to 1.76 | −7.82 to 4.08 | −1.12 to 7.12 | −6.83 to 4.44 |
| Phonological revisions | −0.13 | 0.74* | −0.40* | −0.48 | −0.53* | 0.26 |
| SE | 0.14 | 0.18 | 0.16 | 0.24 | 0.16 | 0.22 |
| 95% CI | −0.47 −0.22 | 0.31–1.17 | −0.79 to −0.01 | −1.05 −0.09 | −0.92 to −0.14 | −0.28 −0.80 |
| Lexical revisions | 8.56* | 12.80* | 0.64 | - 8.37* | 9.21* | 4.43 |
| SE | 1.56 | 1.92 | 1.75 | 2.53 | 1.75 | 2.40 |
| 95% CI | 4.81–12.32 | 8.18–17.42 | −3.58 to 4.86 | −14.46 to −2.29 | 4.99–13.42 | −1.35 to 10.20 |
| Lexical revisions with CS | 0.28 | 0.83* | −0.19 | −2.20* | 0.09 | 1.37* |
| SE | 0.21 | 0.26 | 0.24 | 0.35 | 0.24 | 0.33 |
| 95% CI | −0.23 −0.80 | 0.20–1.47 | −0.77 −0.39 | −3.04 to −1.36 | −0.49 to 0.67 | −2.16 to −0.57 |
| Filler mazes | 14.07* | 15.00* | −2.16 | −12.89* | 11.91* | 2.11 |
| SE | 1.88 | 2.33 | 2.13 | 3.09 | 2.13 | 2.93 |
| 95% CI | −7.29 to 2.97 | 9.40–20.61 | −7.29 to 2.97 | −20.22 to −5.45 | 6.79–17.04 | −4.93 to 9.16 |
| Content mazes | −14.06* | −14.99* | 2.16 | 12.91* | −11.91* | −2.08 |
| SE | 1.89 | 2.33 | 2.13 | 3.09 | 2.13 | 2.93 |
| 95% CI | −18.61 to −9.52 | −20.60 to −9.38 | −2.97 to 7.28 | 5.47–20.35 | −17.04 to −6.78 | −9.12 to 4.97 |

*$p < 0.05$; SE, standard error; CI, confidence interval. Reference groups are the TLD group in each grade. These mean differences are derived from the averaged random effects across subjects.

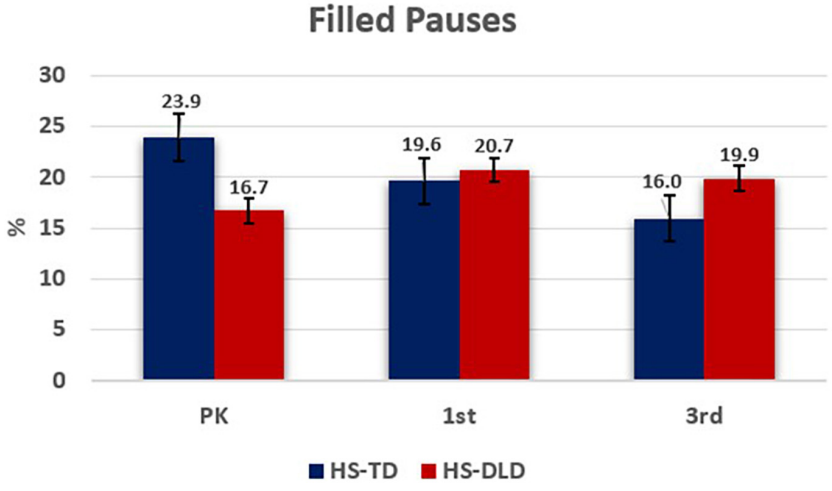



FIGURE 1
Filled pauses by grade and group.

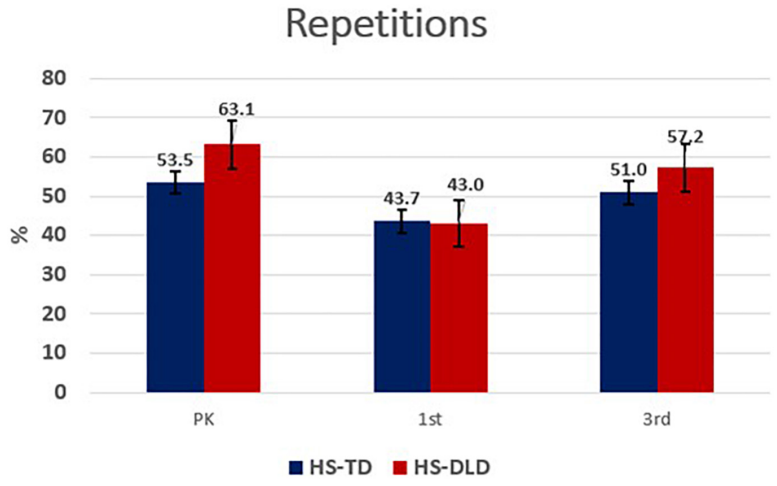



FIGURE 2
Repetitions by grade and group.

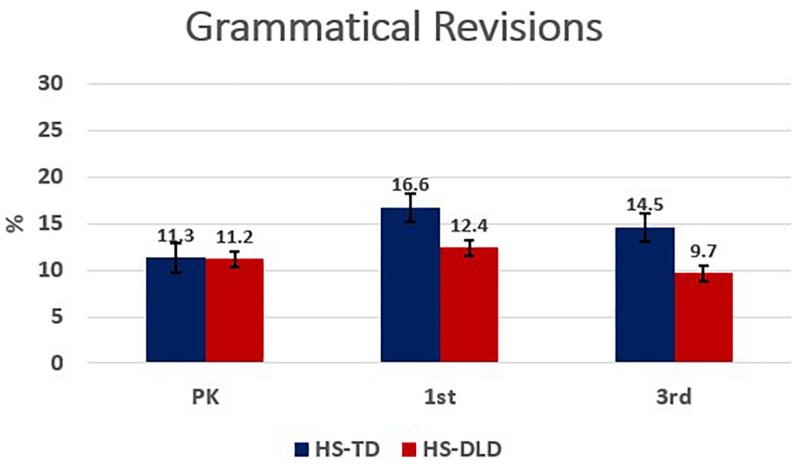



FIGURE 3
Grammatical revisions by grade and group.

significant. Further probing of mean differences revealed significant increases between preschool and first grade for both HS-TLD and HS-DLD groups and a significant decrease between first grade and third grade for the DLD group exclusively (Table 4). A visual representation is shown in Figure 4. Lexical revisions with code-switching were also analyzed and showed main effects for grade [$F(2,275.81) = 16.24$, $p < 0.001$, $\eta^2 = 0.11$] and a group by grade interaction [$F(2,275.81) = 11.31$, $p < 0.001$, $\eta^2 = 0.08$], both with medium effect sizes. Probes of mean differences showed an increase from Preschool to first grade, followed by a decrease from first to third grade for the HS-DLD group exclusively. The HS-TLD group did not show significant changes between any grades. Like phonological revisions, lexical mazes with code-switching represented a minimal portion of overall mazes used, therefore, a visual representation is not provided (see Table 4).

Also, of interest for this research was the use of content mazes (grammatical, phonological, and lexical) and filler mazes (filled pauses and repetitions, Thordardottir and Ellis Weismer, 2002). Descriptive analyses showed that TLD and DLD children used filler mazes more frequently than content mazes overall, with repetitions as the most frequent type (Table 3). In both groups, content maze use increased between preschool and first grade, followed by a decrease. Filler mazes, on the other hand, decreased for both groups from preschool to first grade, followed by an increase in third grade. Interestingly, third grade students with DLD mirror maze production for TD children in preschool, showing similar values for content and filler mazes. Combined results indicate that amongst content mazes, phonological revisions were the least frequent. In the TLD group, grammatical and lexical revisions were similar in frequency in preschool while in the DLD group, grammatical revisions were more frequent than lexical revisions.

Finally, we analyzed the filler and content maze categories using LMM. For filler mazes, the analysis revealed significant increases between preschool and first grade for both DLD and TLD groups. For children with DLD, a decrease between first and third grade was also significant, For content mazes, a decrease in use between preschool and first grade was significant for children with DLD and TLD. For those with DLD, the increase between first grade and third

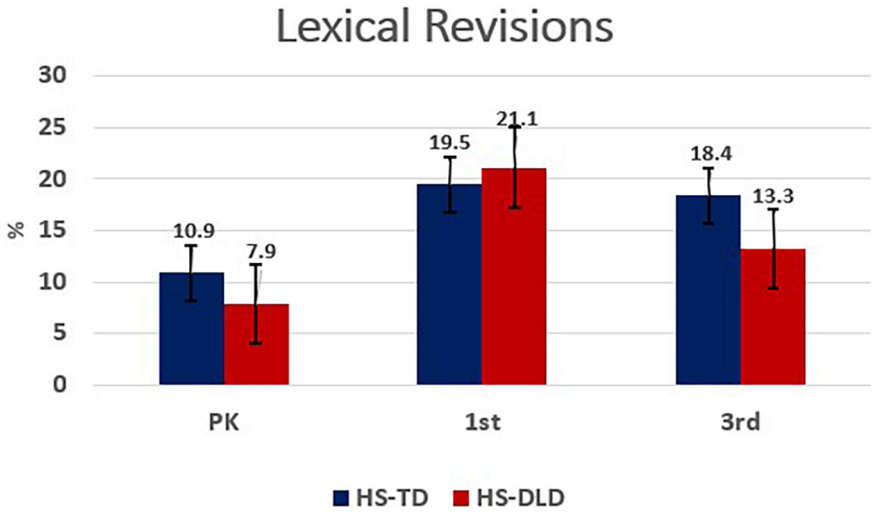



FIGURE 4
Lexical revisions by grade and group.

grade was also significant, though this was not true for children with TLD (**Table 4**).

## Discussion

The purpose of the current study was to examine the use of mazes over time by grade (PreK, 1st, and 3rd grade) and ability group (DLD, TLD) of Spanish HS attending English-only instruction in public schools in Arizona. Also, we examined the specific types of mazes used over grade by ability groups. Our results indicate that children differed in the number of mazes used and the specific types between groups and across grades. In addition, results show that all children increased their Spanish total number of words, number of different words, and mean length of utterance over time despite being in a subtractive language environment (Paradis, 2010; Thordardottir, 2015; Paradis et al., 2021). Exposure to English-only education did not necessarily lead to language loss (Montrul, 2016) and these results support protracted but continued HL development (Martinez-Nieto and Restrepo, 2021).

### Maze performance by grade

Results by grade indicate that the use of mazes is dynamic and affected by variation in language experience. For example, TLD children increased the overall percentage of mazes between Pre-K and 1st grade, followed by a non-significant decrease between first and third grade. In contrast, DLD children decreased the overall percent of mazes used. Patterns also emerged in children's use of specific maze types. We found variability between preschool and third grade when analyzing the specific quantity and quality of mazes used by grade. For example, repetitions and filled pauses are considered filler mazes rather than content mazes in that they do not add to or correct the meaning of the sentence when used; filler mazes were used most frequently across groups and grades. In contrast to the overall maze use, repetitions decreased from PreK to first grade, and increased from first to third for both groups. Bedore et al. (2006) suggested that the use of repetition was not related to language proficiency, as monolingual and bilingual children used comparable amounts of mazes. Results of the present study coincide with this finding. As English proficiency increased and children spent more time in English schooling, repetitions were consistently the most frequent regardless of grade or ability status.

For both groups over time, lexical revisions showed the same pattern as overall maze use in that they increased from PreK to first grade and decreased from first to third, and these did not differ between groups. Phonological and grammatical revision mazes were used the least frequently, along with code-switching lexical revision mazes. Despite infrequent use, the pattern for grammatical mazes increased initially, followed by a decrease in both groups, similarly to the use of repetitions.

### Maze performance by ability group and type

In general, ability groups differed in two significant ways in their maze use by third grade. The TLD group produced more content mazes in third grade compared to the DLD group, while the DLD group used more filler mazes despite similar usage between groups in the earlier grades. These results suggest that the use of content mazes may show more metalinguistic awareness in that TLD children are able to identify and self-correct lexical and grammatical errors while their DLD peers do not have this skill. On the other hand, the high use of filler mazes in both groups suggests an over-reliance on pragmatic strategies to maintain communication. This may reflect language production difficulties associated with accessing the right word, language ability, or both. Filler mazes may result from difficulty with processing demands, in which children are taking time to formulate the language needed to express themselves. That is, the fillers allow the child to maintain the flow of discourse as they formulate

the sentence (Rispoli, 2003). This contrast is notable because HS children decrease the use of filler mazes in first grade, and increase again in third, maybe reflecting the changes in school demands as time in school may decrease the amount of time speaking Spanish. These results contrast with those of Thordardottir and Ellis Weismer (2002) who found that DLD children produced a lower number of filler mazes than TLD children. Current results suggest that the use of content mazes is a sign of typical language development in HS. Similarly, Rispoli (2003, 2018) found that monolingual speakers increased their use of content mazes as their language became more complex. Increases in language complexity correlate with an increase in mazes (MacLachlan and Chapman, 1988; Levelt, 1989; Rispoli and Hadley, 2001), and therefore are part of typical language development (Loban, 1976), whether they are monolingual or bilingual. For example, Loban found great variability in the use of mazes in TLD children, with some having high maze percentages, while others having lower percentages of mazes in their conversations and narratives. Rispoli (2003, 2018) found that when children produced more complex syntax and higher lexical diversity, they produced more revisions; however, these studies were looking at the language of very young children. Within their sample of children with ADHD, Bangert and Finestack (2020) found that higher expressive language ability was related to increased filler mazes, and higher MLU was related to increased revisions, repetitions, and content mazes.

The mean percent of mazed utterances was lower for TLD children at the start of the study (see **Table 2**) compared to the DLD group. By the end of study, the TLD group had the same percentage of mazed words as at the beginning of the study and the DLD group had a lower percentage than at the beginning of the study. The DLD children decreased the percent of mazed utterances over time, but as we discuss below, it is possible that this reflects less awareness of their mistakes. This concurs with Thordardottir and Ellis Weismer (2002) who found that DLD children used less filled pauses than typical children in general.

In our study, DLD children produced similar or more filled pauses than TLD children, although those with DLD slightly decreased their use of filled pauses from first to third grade. Those with TLD decreased their use from Pre-K to first grade, and from first to third grade. Thordardottir and Ellis Weismer (2002) speculated that filled pauses, a type of filler maze, serve a different function than content mazes and, therefore, may be less impacted by language-based deficits in children with DLD.

Our findings may reflect an increase in children with DLDs' ability to compensate for language deficits by giving themselves more time to speak through the use of filled pauses, a pragmatic strategy on which they may rely more as they get older and develop social skills. The TLD group, in contrast, may not rely on this type of pragmatic strategy as much, because they are less likely to have difficulty producing the HL in the first place. Loban (1976) argued that mazes are not necessarily indicative of typical or disordered language and are present in high- and low-ability groups. Therefore, mazes may reflect highly complex and less fluent language, depending on the maze manifestation, but this dysfluent language does not differentiate typical or DLD language. On the other hand, the limited use of mazes can reflect thoughtful, well-planned language or it can reflect low-language ability reflecting limited awareness of their mistakes and lexical difficulties. Therefore, mazes alone are not a good measure to identify DLD given that mazed language also comes naturally with more complex typical language. HS Spanish skills may deteriorate with limited use in the English-only academic environment, or they may improve. Interestingly, particularly for the DLD group, reduction in mazes may indicate less awareness of errors. For example, the TLD group increased the percentage of mazed words and mazed utterances whereas the DLD children decreased in both. These distinctions do not assist speech-language pathologists in differentiating whether a HS child's maze production in the HL suggests a DLD or whether it reflects expected patterns in typical language development. For example, if a third-grade bilingual child produces mazes frequently when telling a story in the HL, and these mazes are often fillers, rather than revisions, this could align with reduced skills in the HL due to DLD or attrition from limited use of the language. Therefore, detailed language use history information on the child's HL input and examination of other language sample measures such as MLU, subordination index, and grammaticality would help make the distinction given the variability of mazes in the bilingual population.

In terms of type by group, the TLD group used more grammatical revision mazes overall than the DLD group, contrasting the findings of Jackson-Maldonado et al. (2013) who reported that DLD Spanish–speaking children produced more mazes in determiners and pronouns than their peers with TLD. These differences across studies may reflect the differences between monolinguals and HS. Many of these revisions involved gender agreement errors for articles such as *el, la, los* and *las*, which are often reported in HS, but not in monolingual speakers. It may be that the DLD group used fewer grammatical mazes because they were not aware of making these gender agreement errors in article use, and therefore did not self-correct with a maze. These results suggest that the TLD group improved their linguistic awareness, showing they could notice and correct these errors because of their more mature linguistic system, which is reflected in longer and more complex utterances in Spanish and a higher number of different words (**Table 2**). These observations concur with Restrepo and Gutiérrez-Clellen (2001) who showed that articles are vulnerable to errors in Spanish HS children with DLD. Despite this observation, the present study did not show a significant interaction effect for grade and group for grammatical revision mazes.

The children differed in the use of content mazes by ability group in third grade. Children with DLD increased the use of content mazes in first grade and significantly decreased in third grade while the TLD children slightly decreased in third grade. This same pattern was observed when we examined lexical and grammatical revisions. Lexical revision mazes were more frequently used than the other types of content mazes for both groups, and also showed a group by grade interaction effect. These mazes increased significantly for both groups between preschool and first grade but decreased significantly for the DLD group only between first and third grade. Overall, the TLD group used a larger quantity of lexical revisions. Like grammatical revision mazes, this higher usage in TLD children may reflect greater proficiency and self-monitoring than the DLD group has, such that they are able to recognize when they have made an error and correct it with a revision. On the other hand, the DLD group does not recognize the error in the first place and simply continues their utterance without a revision. It should be noted that overall, the total number of different words used by both groups was higher each year, which indicates increasing lexical

development in Spanish. As expected, children in the DLD group produced fewer words than children in the TLD group.

Despite infrequent use, we analyzed phonological revision mazes. While the HS-DLD showed a significant increase from preschool to first grade, the HS-TLD increased from first to third grade. However, the interpretation of phonological and lexical mazes with code-switching is limited due to the low percentage of these types. Descriptive language sample data revealed that, as a group, children increased their total number of words, number of different words, and mean length of utterance over time, which is consistent with extant language development research even in subtractive language environments (Paradis, 2010; Thordardottir, 2015; Paradis et al., 2021). These results contrast with the idea that exposure to English-only education leads to language loss (Montrul, 2016) and instead show that children continued to develop their language despite the English-only education context (Martinez-Nieto and Restrepo, 2021). Although a few children did undergo language loss, the majority of the children evidenced language growth, especially those with TLD. These results indicate that the language use at home and outside their school contributes to their development, albeit not necessarily at the academic levels expected in monolingual or dual language instruction contexts. Regardless, there may still be transfer of academic skills from the second language to the heritage language.

## Study limitations and future directions

There were several limitations within the current study. There was a relatively small sample size of 22 participants, which limited the power needed to perform more traditional analyses such as ANOVA. Further, not every student had complete data across the three-time points, limiting some of the power. There was also variability in whether full Spanish transcripts were available as students gained English proficiency over time, given that some students refused to provide Spanish samples or produced samples with fewer than 10 Spanish sentences.

The participants in this study were part of a larger sample of HS children (258 total) within an eight-year longitudinal study. Future analyses with these data will include increased sample sizes and compare of maze production in English across all time points (from Preschool to 6th grade). Observations of whether English maze use follows similar or different developmental patterns as children's change language proficiency changes over time would be of interested to researchers and clinicians.

## Data availability statement

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

## Ethics statement

The studies involving human participants were reviewed and approved by the IRB Arizona State University. Written informed consent to participate in this study was provided by the participants' legal guardian/next of kin.

## Author contributions

All authors listed have made a substantial, direct, and intellectual contribution to the work, and approved it for publication.

## Funding

This study was supported by the US Department of Education–Language Bases of Reading Comprehension (2010–2015), Institute of Education Sciences (CoI), Justice L. (PI), Gray S., Hogan H., Catts H. (CoPis), and MR (CoI).

## Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

## Publisher's note



## References

Aarts, E., Verhage, M., Veenvliet, J. V., Dolan, C. V., and Van Der Sluis, S. (2014). A solution to dependency: Using multilevel analysis to accommodate nested data. *Nat. Neurosci.* 17, 491–496.

Bangert, K. J., and Finestack, L. H. (2020). Linguistic maze production by children and adolescents with attention-deficit/hyperactivity disorder. *J. Speech Lang. Hear. Res.* 63, 274–285. doi: 10.1044/2019_JSLHR-19-00187

Bedore, L., Fiestas, C., Peña, E., and Nagy, V. (2006). Cross-language comparisons of maze use in Spanish and English in functionally monolingual and bilingual children. *Biling. Lang. Cogn.* 9, 233–247. doi: 10.1017/S1366728906002604

Boscolo, B., Bernstein Ratner, N., and Rescorla, L. (2002). Fluency of school-aged children with a history of specific expressive language impairment. *Am. J. Speech Lang. Pathol.* 11, 41–49. doi: 10.1044/1058-0360(2002/005)

Breslow, N. E., and Clayton, D. G. (1993). Approximate inference in generalized linear mixed models. *J. Am. Stat. Assoc.* 88, 9–25.

Bruhn de Garavito, J., and White, L. (2002). "The L2 Acquisition of morphosyntactic and semantic properties of the aspectual tenses preterite and imperfect," in *The acquisition of Spanish Morphosyntax. The L1/L2 //*, Vol. 31, eds A. T. Pérez-Leroux and J. M. Liceras (Dordrecht: Springer), 153–178. doi: 10.1007/978-94-010-0291-2

Byrd, C. T. (2018). Assessing bilingual children: Are their disfluencies indicative of stuttering or the by-product of navigating two languages? *Semin. Speech Lang.* 39, 324–332.

Byrd, C. T., Bedore, L. M., and Ramos, D. (2015). The disfluent speech of bilingual Spanish–English children: Considerations for differential diagnosis of stuttering. *Lang. Speech Hear. Serv. Sch.* 46, 30–43. doi: 10.1044/2014_LSHSS-14-0010

Carias, S., and Ingram, D. (2006). Language and disfluency: Four case studies on Spanish-English bilingual children. *J. Multiling. Commun. Disord.* 4, 149–157. doi: 10.1080/14769670601092663

Cohen, J., Cohen, P., West, S. G., and Aiken, L. S. (2002). *Applied multiple regression/correlation analysis for the behavioral sciences*. Oxfordshire: Taylor & Francis Group, doi: 10.4324/9780203774441

DeJoy, D. A., and Gregory, H. H. (1985). The relationship between age and frequency of disfluency in preschool children. *J. Fluency Disord.* 10, 107–122.

Dollaghan, C. A., and Campbell, T. F. (1992). A procedure for classifying disruptions in spontaneous language samples. *Lang. Disord.* 12, 56–69.

Fiestas, C. E., Bedore, L. M., Peña, E. D., Nagy, V. J. (2005). "Use of mazes in the narrative language samples of bilingual and monolingual 4-to 7-year old children," in *Proceedings of the 4th international symposium on bilingualism*, eds J. Cohen, K. T. McAlister, K. Rolstad and J. MacSwan (Somerville, MA: Cascadilla Press), 730–740.

Finneran, D. A., Leonard, L. B., and Miller, C. A. (2009). Speech disruptions in the sentence formulation of school-age children with specific language impairment. *Int. J. Lang. Commun. Disord.* 44, 271–286. doi: 10.1080/13682820902841385

Gelman, A., and Hill, J. (2007). *Data analysis using regression and multilevel/hierarchical models*. Cambridge, NY: Cambridge University Press.

Guo, L. Y., Tomblin, J. B., and Samelson, V. (2008). Speech disruptions in the narratives of English-speaking children with specific language impairment. *J. Speech Lang. Hear. Res.* 57, 722–738.

Gutiérrez-Clellen, V. F., Simon-Cereijido, G., and Erickson Leone, A. (2009). Codeswitching in bilingual children with specific language impairment. *Int. J. Biling.* 13, 91–109. doi: 10.1177/1367006909103530.Codeswitching

Hodge, V., Rescorla, L., and Ratner, N. (1999). "Fluency in toddlers with SLI: A preliminary investigation," in *American speech-language-hearing association annual convention*, San Francisco, CA.

Jackson-Maldonado, D., Bárcenas, R., and Alarcón, L. (2013). "Variabilidad morfosintáctica en las narrativas de niños con Trastorno Específico de Lenguaje," in *Las narrativas y su impacto en el desarrollo infantil*, ed. R. Barriga (Mexico City: El Colegio de México), 691–728.

Kaur, R., Hegde, M., Shruthi, T. S., Kumaraswamy, S., and Rao, T. A. S. (2011). Mazes in typically developing bilingual children. *Asia Pac. J. Speech Lang. Hear.* 14, 197–203. doi: 10.1179/jslh.2011.14.4.197

Krueger, C., and Tian, L. (2004). A comparison of the general linear mixed model and repeated measures ANOVA using a dataset with multiple missing data points. *Biol. Res. Nurs.* 6, 151–157. doi: 10.1177/1099800404267682

Kupisch, T., and Rothman, J. (2018). Terminology matters! Why difference is not incompleteness and how early child bilinguals are heritage speakers. *Int. J. Biling.* 22, 564–582. doi: 10.1177/1367006916654355

Leadholm, B. J., and Miller, J. (1995). *Language sample analysis: The Wisconsin guide*. Madison, WI: Wisconsin Department of Public Health.

Leonard, L. B. (2014). *Children with specific language impairment*. Cambridge, MA: MIT press.

Levelt, W. J. M. (1989). *Speaking: From intention to articulation. A bradford book*. Cambridge, MA: The MIT Press.

Loban, W. D. (1976). *Language development: Kindergarten through grade twelve. (Research report number 18)* Urbana, IL: National Council of Teachers of English.

MacLachlan, B. G., and Chapman, R. S. (1988). Communication breakdowns in normal and language learning-disabled children's conversation and narration. *J. Speech Hear. Disord.* 53, 2–7.

Magezi, D. (2015). Linear mixed-effects models for within-participant psychology experiments: An introductory tutorial and free, graphical user interface (LMMgui). *Front. Psychol.* 6:2. doi: 10.3389/fpsyg.2015.00002

Martinez-Nieto, L., and Restrepo, M. A. (2021). Grammatical gender in Spanish child heritage speakers. *Ling. Approaches Biling.* 13, 267–297. doi: 10.1075/lab.20042.mar

Mayer, M. (1967). *A boy, a dog, a frog and a friend*. New York, NY: Dial Press.

Mayer, M. (1973). *Frog on his own*. New York, NY: Dial Press.

Merits-Patterson, R., and Reed, C. G. (1981). Disfluencies in the speech of language-delayed children. *J. Speech Lang. Hear. Res.* 24, 55–58. doi: 10.1044/jshr.2401.55

Miller, J., and Iglesias, A. (2020). *Systematic analysis of language transcripts (SALT), version 20 [Computersoftware]*. Madison, WI: SALT Software, LLC.

Montrul, S. (2016). *The acquisition of heritage languages*. Cambridge: Cambridge University Press.

Morgan, G., Restrepo, M. A., and Auza, A. (2013). Comparison of Spanish morphology in monolingual and Spanish–English bilingual children with and without language impairment. *Biling. Lang. Cogn.* 16, 578–596. doi: 10.1017/S1366728912000697

O'Grady, W., Kwak, H. Y., Lee, O. S., and Lee, M. (2011). An emergentist perspective on heritage language acquisition. *Stud. Second Lang. Acquis.* 33, 223–245. doi: 10.1017/S0272263110000744

Paradis, J. (2005). Grammatical morphology in children learning English as a second language: Implications for similarities with specific language impairment. *Lang. Speech Hear. Serv. Sch.* 36, 172–187.

Paradis, J. (2010). Bilingual children's acquisition of English verb morphology: Effects of language exposure, structure complexity, and task type: Bilingual children's acquisition of English. *Lang. Learn.* 60, 651–680. doi: 10.1111/j.1467-9922.2010.00567.x

Paradis, J., Genesee, F., and Crago, M. B. (2021). *Dual Language Development & Disorders: A handbook on bilingualism and second language learning*, 3rd Edn. Baltimore, MA: Paul H. Brookes Publishing Co.

Restrepo, M. A., and Gutiérrez-Clellen, V. F. (2001). Article use in Spanish-speaking children with specific language impairment. *J. Child Lang.* 2001, 433–452. doi: 10.1017/S0305000901004706

Restrepo, M. A., Gorin, J. S., Gray, S., Morgan, G. P., and Barona, N. (2010). *Development of a language impairment screener for Spanish speaking children–SSLIC: Phase 1–task development*. Washington, DC: Society for Research on Educational Effectiveness.

Rieger, C. L. (2003). Repetitions as self-repair strategies in English and German conversations. *J. Pragmat.* 35, 47–69.

Rispoli, M. (2003). Changes in the nature of sentence production during the period of grammatical development. *J. Speech Lang. Hear. Res.* 46, 810–830.

Rispoli, M. (2018). Changing the subject: The place of revisions in grammatical development. *J. Speech Lang. Hear. Res.* 61, 360–372.

Rispoli, M., and Hadley, P. (2001). The leading-edge: The significance of sentence disruptions in the development of grammar. *J. Speech Lang. Hear. Res.* 44, 1131–1143. doi: 10.1044/1092-4388(2001/089)

Rispoli, M., Hadley, P., and Holt, J. (2008). Stalls and revisions: A developmental perspective on sentence production. *J. Speech Lang. Hear. Res.* 51, 953–966. doi: 10.1044/1092-4388(2008/070)

Rojas, R., and Irani, F. (2020). Classifying disfluencies in preschool- and school-age Spanish–English bilinguals who do not stutter: An exploratory study. *Perspect. ASHA Special Interest Groups* 5, 119–130. doi: 10.1044/2019_PERSP-19-00164

Taliancich-Klinger, C. L., and Bedore, L. M. (2019). Frequency of mazes in an experimental narrative task in monolingual English and Spanish-English bilingual children. *Clin. Linguist. Phon.* 33, 547–569. doi: 10.1080/02699206.2018.1563215

Taliancich-Klinger, C. L., Byrd, C. T., and Bedore, L. M. (2013). The disfluent speech of a Spanish–English bilingual child who stutters. *Clin. Linguist. Phon.* 27, 888–904. doi: 10.3109/02699206.2013.813076

Taliancich-Klinger, C., Summers, C., and Greene, K. J. (2021). Mazes in Spanish-English dual language learners after language enrichment: A case study. *Speech Lang. Hear.* 25, 269–282.

Thordardottir, E. T. (2015). The relationship between bilingual exposure and morphosyntactic development. *Int. J. Speech Lang. Pathol.* 17, 97–114. doi: 10.3109/17549507.2014.923509

Thordardottir, E. T., and Ellis Weismer, S. (2002). Content mazes and filled pauses in narrative language samples of children with specific language impairment. *Brain Cogn.* 48, 587–592. doi: 10.1006/brcg.2001.1422

Tsimpli, I. M., Peristeri, E., and Andreou, M. (2016). Narrative production in monolingual and bilingual children with specific language impairment. *Appl. Psycholinguist.* 37, 195–216.

U.S. Census Bureau, (2016). *Facts for features: Hispanic heritage month 2016*. Available online at: http://www.census.gov/newsroom/facts-for-features/2016/cb16-ff16.html (accessed November 10, 2022).

Valdés, G. (2005). Bilingualism, heritage language learners, and SLA research: Opportunities lost or seized? *Mod. Lang. J.* 89, 410–426.

Wetherell, D., Botting, N., and Conti-Ramsden, G. (2007). Narrative in adolescent specific language impairment (SLI): A comparison with peers across two different narrative genres. *Int. J. Lang. Commun. Disord.* 42, 583–605. doi: 10.1080/13682820601056228

Wiig, E. H., Secord, W. A., and Semel, E. (2009). *Clinical evaluation of language fundamentals— Preschool, 2nd ed. (CELF Preschool-2 Spanish)*. Toronto: The Psychological Corporation/A Harcourt Assessment Company.

frontiers | Frontiers in Psychology

TYPE Original Research
PUBLISHED 15 June 2023
DOI 10.3389/fpsyg.2023.1115108



OPEN ACCESS

EDITED BY
Sao Luis Castro,
University of Porto,
Portugal

REVIEWED BY
Rufan Luo,
Arizona State University,
United States
Elena Florit,
University of Verona,
Italy

*CORRESPONDENCE
He Sun
✉ he.sun@nie.edu.sg

SPECIALTY SECTION
This article was submitted to Psychology of Language, a section of the journal Frontiers in Psychology

RECEIVED 03 December 2022
ACCEPTED 07 March 2023
PUBLISHED 15 June 2023

CITATION
Sun H, Tan J and Chen W (2023) COVID-19 and bilingual children's home language environment: Digital media, socioeconomic status, and language status. *Front. Psychol.* 14:1115108. doi: 10.3389/fpsyg.2023.1115108



# COVID-19 and bilingual children's home language environment: Digital media, socioeconomic status, and language status

He Sun[1]*, Justina Tan[2] and Wenli Chen[1]

[1]National Institute of Education, Nanyang Technological University, Singapore, Singapore, [2]School of Social Sciences, Nanyang Technological University, Singapore, Singapore

Input is considered crucial in bilingual children's language development. This is especially true for bilingual children's mother tongue language learning given its common reduction in input opportunities due to the dominance of one language within society, as seen in countries and regions from Wales to Singapore. Previous studies tend to focus on the quantity and quality of conventional active communication and resources (e.g., speaking and reading with parents) on bilingual children's language development, and substantially, fewer studies have explored this topic from the perspective of digital media. However, the COVID-19 pandemic has accentuated the critical role of digital media in various aspects of life, including bilingual children's home language environment. Thus, to holistically understand bilingual children's daily language input patterns, it is imperative to explore both their conventional and digital media input resources. The current study focuses on English-Mandarin bilingual children in Singapore and would like to explore (1) whether their conventional and digital media language environments have been affected by the COVID-19 pandemic and (2) whether the societal status of a language and familial socioeconomic status (SES) would affect bilingual children's conventional and digital media input. Survey data from 162 parents of English-Mandarin bilingual preschoolers (3 to 6 years old) were used to explore the two research questions. Two online parental questionnaires were employed for data collection. One-way repeated-measures MANOVA and path models were used to address the questions. The results indicated that input patterns from nuclear family members had not been affected by COVID-19; however, the amount and frequency of conventional and digital media materials and activities increased significantly since COVID-19. Higher-SES families possessed more conventional materials and conducted conventional activities more often, while lower-SES families possessed more digital media materials. Both conventional and digital media materials and activities were richer in English than in Mandarin. Higher-SES families perceived digital media usage for learning to be of less importance than lower-SES families. The implications for early bilingual learning following COVID-19 are discussed.

KEYWORDS

**COVID-19, home language environment, child bilingualism, digital media, socioeconomic status, language status, mother tongue language, screen time**

# 1. Introduction

Previous research has established the critical role that the home language environment plays in bilingual children's language and literacy development (Sun et al., 2018b, 2021, 2022c; Paradis et al., 2020; Sun and Ng, 2021; Song et al., 2022). Most of the existing research tends to examine the impact of the conventional format of language input, such as the current input pattern between parents and children (De Houwer, 2007; Bedore et al., 2016), while much less is known about the use of digital media and its influence on bilingual children's language learning. In Singapore, a study exploring the relationship between multimedia input and language outcomes of English-Mandarin kindergartners found differential impacts of the resource on English and Mandarin (Sun and Yin, 2020), highlighting the need for greater study in this area. Digital media refers to media content that is produced and provided by digital devices, largely adopting digital media formats of multimedia content (e.g., text, audio, images, and animation) displayed as a single demonstration. The quality of digital media input (e.g., educational value of program content) matters to child development (Courage, 2017) and well-designed educational digital media have been found to positively influence bilingual children's attention and language learning outcomes (Sun et al., 2019, 2022b). Based on 13 studies that involved 1955 children with a mean age range from 1 to 5 years old, Madigan et al. (2020) found that viewing digital educational programs on television (e.g., Dora the Explorer) has a positive and significant impact on children's language skills (combined effect size $r = 0.13$). However, screen time and the interactions between parent and child are commonly negatively correlated, especially for low-SES households (Mendelsohn et al., 2008). This has relevance for language development as the use of digital over traditional media has impacted input quantity, with fewer words being exchanged between caregiver and child (Healey et al., 2019). It is thus vital that caregivers remain to be mindful of allowing digital media to replace everyday interactions (Healey et al., 2019), so as to minimize the drawbacks of using digital media. As digital media input (e.g., from TV, tablets, and smartphones) turns to be an increasingly prevalent part of children's home learning environment since COVID-19 (Sun et al., 2022a), there exists an urgency to adopt a digital media perspective on top of exploring conventional input factors to capture bilingual children's early language development adequately and holistically. The current study intends (1) to document potential changes in bilingual home language environment since COVID-19 in Singapore, and (2) to explore the relations of familial socioeconomic status (SES) and language status (i.e., societal dominant language vs. mother tongue language) with children's conventional and digital media input at home.

## 1.1. COVID-19's impact on home language environment

Since the outbreak of COVID-19, the amount of time that parents spent with their children has increased, giving children more opportunities to receive language input from family members. For instance, in Turkey, the presence of the father at home was particularly notable, leading to a marked increase in language input opportunities for fathers (Kanero and Aktan-Eryciyes, 2021). For bilingual children, COVID-19 may bring differential changes to their dual language environment at home. Sheng et al. (2021) matched two groups of English-Mandarin bilingual families in the US (each cohort $n = 19$, aged 4–8 years old), with one group tested before COVID-19 and one group tested during the pandemic. They found that parents reported speaking less English and more Mandarin at home during the lockdown period. Similarly, a survey conducted on 157 multilingual families from 67 countries found that many of them engaged in more conversation in their minority language at home since the onset of COVID-19, exposing children more frequently to their heritage languages, with some parents even sharing that their children began to grow a liking for these languages that they were previously not so fond of (Murrmann, 2021). Hence, COVID-19 may modify family members' input pattern in favor of children's mother tongue language development. Aside from speech patterns, the frequency of literacy activities has also been influenced. Sonnenschein et al. (2021) invited 162 parents of 2- to 9-year-old children in the US to complete a questionnaire on their children's home literacy and digital environment. They found that as many as "86.3% of the parents reported that their children had increased the use of home literacy activities during COVID-19" (p. 802). They assumed that the increase was due to the limited opportunities to conduct outdoor activities during the pandemic. Meanwhile, in terms of digital media input, children were seen to engage in more digital activities at home since the pandemic (Murrmann, 2021; Seguin et al., 2021; Sonnenschein et al., 2021). Particularly, there is evidence for an increase in the use of devices to access language-related media (Sheng et al., 2021). Taking shared book reading as an example, research has found that it has shifted toward the use of virtual devices, as caregivers adapt to screen-mediated reading methods, without an overall change to the frequency of shared-book reading practices (Read et al., 2021).

## 1.2. The influence of socioeconomic status and societal language status on language input

Despite the general trend since COVID, there still exists substantial variation in bilingual children's home language environment. Many factors may contribute to the differences in children's home language and literacy environments (Sun et al., 2018a,b, 2020), and macro-level issues like socioeconomic status (SES) present a reliable metric to explain some of the differences. SES has commonly been defined using parental levels of education and income (Sun, 2019; Sun et al., 2021, 2022c). Previous research has shown that students from low-income families underperform in language assessments as compared to more affluent peers (Hoff, 2013), pointing toward SES's impact to either limit or propel children's language learning. Households with higher SES possess greater access to resources, unlocking the potential for richer home language practice (McDaniel et al., 2017). Apart from being able to provide a greater quantity and variety of books and literacy resources, parents from higher-SES backgrounds may also interact more with their children and tend to use more complex language in their interactions (Hoff, 2006; Ebert et al., 2020). With COVID-19 placing an emphasis on home learning, SES-related differences can potentially widen the divide between students from different SES families. Increased interaction with family at home increases the significance of the impact of quantity and quality of parent–child interaction and the

availability of language and literacy resources. This is true for German families, where parents who are less educated were twice less likely to adequately provide support for their children's schoolwork in terms of engagement and resources during that period (Sari et al., 2021). It is thus worrying to note that parents from lower-SES backgrounds would engage in less formal (e.g., literacy skill practice) and informal (e.g., shared book reading and gameplay) parental practices with their children (Treviño et al., 2021).

Shifting the focus to a bilingual context, English-Spanish children from higher-SES backgrounds also displayed better learning skills in both languages than those from lower-SES families, with this effect being mediated by the home literacy environment (Luo et al., 2021). The SES effect differed for both languages, where the relationship between SES and Spanish knowledge was completely mediated by home literacy environment and Spanish knowledge, whereas for English, there was a direct effect of SES on English learning skills (Luo et al., 2021). In another longitudinal case study, Dolean (2022) illustrated how a higher-SES English-Spanish family was able to extensively support their child's English learning to the extent where he performed better than his monolingual English peers. To sum up, SES can affect bilingual children's home language and literacy environment through uneven access to literacy materials at home and the uneven quantity and quality of interaction from caregivers.

Besides SES, bilingual children's language and literacy environment might be also affected by language status. Bilingual children may have more channels and resources to receive language input in their societal dominant language than in their mother tongue language (Sun et al., 2018a,b, 2020, 2022c; Sun and Yin, 2020). This relates to multilingual countries like Singapore, where there are four official languages (i.e., English, Mandarin Chinese, Malay, and Tamil) and three major ethnic groups (i.e., Chinese, Malay, and Indians). Since 1965, English has been relegated to the societal dominant language for better inter-ethnic communication and trade with the world, being widely adopted in education, business, media, and governance contexts. In contrast, mother tongues (i.e., Mandarin, Malay, and Tamil) are mainly promoted for cultural preservation. The different social statuses of English and mother tongue languages resulted in that "English is increasingly becoming the mother tongue for more and more Singaporeans, and their ethnic languages are technically more like second languages" (Cavallaro and Ng, 2014, p. 36). Under this circumstance, it is unsurprising to witness an increasingly English-dominant environment in more households. Sun and colleagues (2018) examined 805 K1 children's bilingual home language and literacy environment and found that children's English input environment was better than their mother tongue language environment in the amount of language input from household members, the amount of children's language use with household members, the percentage of media input in respective languages, and the number of children's books. Such discrepancy in children's dual language environments may be due to parents' utilitarian thinking and rich resources available in English. As a *lingua franca*, English has been taught and used worldwide, and materials are easy to access in various age-appropriate formats (e.g., books, cartoons, movies, and games). Mother tongue languages, in contrast, may attract substantially less attention from both users and materials developers, resulting in a resource disparity.

### 1.3. The current study

The current study aims to explore the extent to which bilingual children's home learning environment has been affected by the COVID-19 pandemic, and whether such environment is affected by SES and societal language status. Traditional materials (e.g., hard copy books for children) and activities (e.g., play with magnetic letters or letter toys/cards) were assigned to the conventional group, while those involve digital elements (e.g., "watch educational TV shows or online videos," "play educational apps on a tablet or smartphone") were assigned to the digital media category. The possible changes in children's conventional and digital media input before and since COVID-19 were investigated, at the levels of both English and Mandarin in Singapore. The specific research questions and hypotheses are as follows:

> *Research Question 1*: Have English-Mandarin bilingual children's conventional and digital media language environments been affected by the COVID-19 pandemic in Singapore?
>
> *Hypothesis 1*: Based on the literature review (*e.g.*, Sheng et al., 2021; Sonnenschein et al., 2021), both conventional and digital media input environment are expected to be affected. Specifically, children may have an increased proportion of Mandarin input from family members since COVID-19, and they may have more resources and activities at home in both languages.
>
> *Research Question 2*: Do children's SES and language status influence English-Mandarin bilingual children's conventional and digital media input environment? SES is operationalized using parental educational level and income.
>
> *Hypothesis 2*: Based on the literature review (*e.g.*, Sun et al., 2018a,b; Luo et al., 2021; Dolean, 2022), children from higher-SES families are expected to have better language environment in terms of resources and activities. Children's English language and literacy environment is better than that of Mandarin.

## 2. Methods

### 2.1. Participants and procedure

The dataset employed for this study is a part of a longitudinal project on bilingual children's book reading at home. The project is approved by the university's institutional review board. Informed consent was obtained on the survey platform before the start of the questionnaires. One hundred and ninety-one parents of preschoolers were recruited by convenience for the COVID-19 questionnaire. Both parent and child had to be living in Singapore since COVID-19 affected the local community to be eligible for the study. The children also had to be English-Mandarin bilingual language learners and have no history of developmental or learning impairment. A total of 26 responses were excluded from the analyses due to the diagnoses of

learning/development issues, or due to multiple language exposure (e.g., Filipino dialect, Spanish, and Tamil). Three participants were further excluded due to missing or invalid data (e.g., repeated responses). The final dataset used for analyses consisted of data collected from 162 parents of Mandarin-English bilingual children (86 boys and 76 girls).

## 2.2. Parental questionnaires

Two online parental questionnaires were employed for data collection between April and November 2021 over Qualtrics. This consisted of a questionnaire asking about children's general background, and a questionnaire specific to COVID-19, which was used in the main analysis. The latter targeted children's English and Mandarin home language environment along the timeline "before COVID-19" and "since COVID-19." Items were adapted from the SMALLQ (Chia et al., 2020), the COVID-19-HELP (King et al., 2020), and the QQ-MediaSEED (Sun et al., 2022a). Since the COVID-19 pandemic, people in Singapore mainly experienced two phases of living. In the first phase (April–December 2020), Singaporean first went through a circuit breaker (from April 7, 2020, to June 1, 2020), during which social life and in-person education were suspended, and people remained in a state of uncertainty until the end of that year. Since 2021, the situation improved, but children's home language and digital environment was still found be heavily influenced by COVID-19, like the first phase (Sun et al., 2022a). Therefore, we combined the two phases and asked parents to indicate the situation during this period which was labeled since COVID-19.

To explore family members' language input pattern (i.e., father, mother, siblings, maternal grandparents, paternal grandparents, helper, and others), information on the proportion of English and Mandarin spoken by every family member to the child before and since COVID-19 was asked. Given that most of the children in Singapore are from nuclear families (SDS, 2020), the current study focused on the input patterns from the mother, father, and siblings for a measure of core input. The quantity of traditional materials (e.g., hardcopy books for children and educational board or card games) and digital materials (e.g., digital books and digital educational games for children) in English and Mandarin were asked in a similar manner. The frequency of conventional activities and digital media activities was also measured. Examples of the games and programs for digital media were provided. Parents were also invited to indicate their children's age of first exposure to fixed screens (e.g., TV, desktop computer) and mobile screens (e.g., smartphone, tablet), and the types of digital media they possess at home. Furthermore, parents were asked to indicate how important they felt digital media was for children (i.e., to "Improve language and other skills," for "Entertainment," for "Communication" and for themselves (i.e., to "Keep child occupied," "Distract or divert child's attention," "Put child to sleep"). Items related to children and parents were averaged, respectively. Children's demographic information (e.g., data of birth, gender, mother's education level) was extracted from another linked questionnaire. To measure SES, information on income and education level was gathered. There were 30 options for monthly household income, ranging from "Below 1,000″ to "15,000 and over," with S$500 increment for each higher level. There were 8 options for parental education, ranging from "No qualification" to "Doctorate degree."

## 2.3. Data analysis

One-way repeated-measures multivariate analysis of variance (MANOVA) was adopted to explore the answers for the first research question, and structural equation modeling (SEM; IBM SPSS AMOS 25) was used to examine the postulated relationships in the second research question. SEM is a popular multivariate method commonly used in the social sciences, which leverages on latent trait models. Based on the literature, the models in the current study were created using four measures of fit (Klem, 2000). Chi-square statistics are reported, alongside Tucker and Lewis's fit index (TLI), comparative fit index (CFI), and the root mean square error of approximation (RMSEA). A non-significant Chi-square suggests that the model in theory is not significantly different from the model derived from data collected, implying good model fit. However, considering that Chi-square is sensitive to sample size, such a result would be challenging to attain. Thus, TLI and CFI values are explored since they are not affected by sample size. A good model fit is suggested by the higher values of these two indicators ($\geq$0.9) (Aryadoust and Liu, 2015). On the other hand, RMSEA values are interpreted by a good model fit being represented by smaller values ($\leq$0.06) (Kenny and McCoach, 2003).

# 3. Results

The descriptive statistics of the 162 children are summarized in Table 1. Children started to receive fixed screen exposure (e.g., TV, computer) since around 1 year old and a half ($M$ = 19.83 months, SD = 12.36 months) and they had access to mobile devices (e.g., smartphone and tablet) since around 2 years old ($M$ = 26.32 months, SD = 14.27 months). On average, each family possessed three types of digital devices ($M$ = 3.4, SD = 0.97), with most indicating ownership of televisions, computers, and mobile devices. Most parents possessed a bachelor's degree (i.e., 68.10% of mothers and 53.99% of fathers), with a mean household income around Singapore $11000–11,499. In many households, core family members (i.e., father, mother, and siblings) spoke English more often than Mandarin to their children (before COVID-19, $M$ = 3.52, SD = 0.94; since COVID-19, $M$ = 3.49, SD = 0.94), and the same trend was found in terms of children's language use with core family members (before COVID-19, $M$ = 3.75, SD = 1.01; since COVID-19, $M$ = 3.75, SD = 0.96). In terms of conventional materials (i.e., hardcopy books, board/card games), children on average possessed about 10–29 copies of in English (before COVID-19, $M$ = 3.09, SD = 0.97; since COVID-19, $M$ = 3.33, SD = 1) and 1–9 copies in Mandarin (before COVID-19, $M$ = 2.33, SD = 0.81; since COVID-19, $M$ = 2.48, SD = 0.82). For children's digital media materials (i.e., eBooks, Digital educational games), most of the participants either had no such materials at all or had less than 10 copies in English (before COVID-19, $M$ = 1.44, SD = 0.66; since COVID-19, $M$ = 1.57, SD = 0.68) and in Chinese (before COVID-19, $M$ = 1.3, SD = 0.62; since COVID-19, $M$ = 1.39, SD = 0.68). In terms of the frequency of

TABLE 1 Descriptive of children's demographics and bilingual language environment.

| | *N* | *M* (SD) | Range |
|---|---|---|---|
| Age (in months) | 162 | 58.17(6.83) | 40–73 |
| Onset Age. Fixed Screen (in months) | 162 | 19.83(12.36) | 0–60 |
| Onset Age. Mobile Screen (in months) | 162 | 26.32(14.27) | 0–60 |
| Number of Digital Media | 162 | 3.4(0.97) | 1–6 |
| Mother Education Level | 162 | 6.04(0.73) | 2–8 |
| Father Education Level | 162 | 5.85(1.13) | 2–8 |
| Household Income | 162 | 22.01(7.71) | 2–30 |

| | **Before COVID-19** | | | **Since COVID-19** | | |
|---|---|---|---|---|---|---|
| | ***N*** | ***M* (SD)** | **Range** | ***N*** | ***M* (SD)** | **Range** |
| Language Input. Core Family | 162 | 3.52 (0.94) | 1.33–5 | 160 | 3.49 (0.94) | 1.33–5 |
| Language Output. Core Family | 162 | 3.75 (1.01) | 1–5 | 160 | 3.75 (0.96) | 1–5 |
| Eng. Traditional Materials | 162 | 3.09 (0.97) | 1–6 | 162 | 3.33 (1) | 1–6 |
| Man. Traditional Materials | 162 | 2.33 (0.81) | 1–6 | 162 | 2.48 (0.82) | 1–6 |
| Eng. Digital Media Materials | 162 | 1.44 (0.66) | 1–6 | 162 | 1.57 (0.68) | 1–6 |
| Man. Digital Media Materials | 162 | 1.3 (0.62) | 1–6 | 162 | 1.39 (0.68) | 1–6 |
| Eng. Traditional Activities | 162 | 3 (0.94) | 1–5.5 | 162 | 3.19 (0.97) | 1–5.5 |
| Man. Traditional Activities | 162 | 2.14 (0.97) | 1–5.75 | 162 | 2.25 (0.97) | 1–5.75 |
| Eng. Digital Media Activities | 162 | 2.34 (0.97) | 1–6.33 | 162 | 2.52 (0.98) | 1–6.33 |
| Man. Digital Media Activities | 162 | 1.62 (0.84) | 1–5.33 | 162 | 1.71 (0.86) | 1–5.33 |
| Eng. Digital Media Importance | 162 | 2.46 (0.86) | 1–5 | 162 | 2.76 (0.89) | 1–5 |
| Man. Digital Media Importance | 162 | 2.16 (0.85) | 1–5 | 162 | 2.34 (0.86) | 1–5 |

conducting traditional activities at home (e.g., playing letter toys), children on average had such activities 1–2 times per week in English (before COVID-19, $M = 3$, SD = 0.94; since COVID-19, $M = 3.19$, SD = 0.97), and 1–3 times per month in Mandarin (before COVID-19, $M = 2.14$, SD = 0.97; since COVID-19, $M = 2.25$, SD = 0.97). For children's digital media activities at home (e.g., watching educational videos), children on average had such activities 1–3 times per month in English (before COVID-19, $M = 2.34$, SD = 0.97; since COVID-19, $M = 2.52$, SD = 0.98), and barely any digital media activities in Mandarin (before COVID-19, $M = 1.62$, SD = 0.84; since COVID-19, $M = 1.71$, SD = 0.86).

## 3.1. Bilingual children's home language environment before and since COVID-19

One-way repeated-measures multivariate analysis of variance (MANOVA) was conducted to explore the impact of COVID-19 on children's home language environments. The model for home language environment has nine repeated-measure factors (i.e., Language Input from Core Family, English and Mandarin Traditional Materials, English and Mandarin Traditional Activities, English and Mandarin Digital media Materials, and English and Mandarin Digital media Activities). The results indicated that there was a significant effect of COVID-19 on children's input environment at home, $F$ (9, 144) = 8.487, $p < 0.0001$, Wilk's $\Lambda = 0.653$, partial $\eta^2 = 0.347$. Separate univariate ANOVAs on the outcome variables considering Bonferroni correction ($p < 0.006$) revealed significant improvement on all aspects but not language input pattern from core family members (Table 2).

## 3.2. SES and language in bilingual children's home language environment

Table 3 demonstrates the results of the second research question regarding the predictors of home language environment. Children's parental education levels and household income were used to create the latent "SES" factor. In the SEM model, SES and language (i.e., English vs. Mandarin) were taken as independent variables, while the five environmental factors were taken as dependent variables. The value of each environment factor was the average of the before- and since-COVID-19 pandemic scores. Specifically, SES has been used to predict children's language input from family members ("Language Input. Core Family. Ave"), quantity of materials ("Traditional Materials. Ave," "Digital media Materials. Ave"), and types of activities ("Traditional Activities. Ave," "Digital media Activities. Ave"). Language was used to predict four environmental factors ("Traditional Materials. Ave," "Digital media Materials. Ave," "Traditional Activities. Ave," "Digital media Activities. Ave"). The results reveal that children's traditional bilingual environment (i.e., language input from core family members, number of traditional materials possessed, and the frequency of conducting conventional activities) are positively related to familial SES: the higher children's familial SES is, the better their conventional language environment

TABLE 2 The results of "Tests of Within-Subjects Effects" for children's language environment at home.

| Variables | Type III sum of squares | df | Mean square | *F* | *p* | Partial eta squared |
|---|---|---|---|---|---|---|
| Language Input. Core Family | 0.01 | 1 | 0.01 | 0.25 | 0.620 | 0.002 |
| Eng. Traditional Material | 4.47 | 1 | 4.47 | 30.53 | 0.000 | 0.167 |
| Man. Traditional Material | 1.73 | 1 | 1.73 | 26.22 | 0.000 | 0.147 |
| Eng. Traditional Activities | 3.09 | 1 | 3.09 | 28.14 | 0.000 | 0.156 |
| Man. Traditional Activities | 1.00 | 1 | 1.00 | 22.54 | 0.000 | 0.129 |
| Eng. Digital Media Material | 1.44 | 1 | 1.44 | 33.40 | 0.000 | 0.180 |
| Man. Digital Media Material | 0.36 | 1 | 0.36 | 12.84 | 0.000 | 0.078 |
| Eng. Digital Media Activities | 2.69 | 1 | 2.69 | 28.14 | 0.000 | 0.156 |
| Man. Digital Media Activities | 0.61 | 1 | 0.61 | 15.20 | 0.000 | 0.091 |

TABLE 3 The results of structural equation modeling on children's bilingual home environment.

| Path | | | *B* | *β* | S.E. | C.R. | *p* |
|---|---|---|---|---|---|---|---|
| SES | > | Household Income | 1.00 | 0.59 | | | |
| SES | > | Father Education Level | 0.16 | 0.65 | 0.02 | 7.14 | *** |
| SES | > | Mother Education Level | 0.11 | 0.67 | 0.02 | 7.15 | *** |
| SES | > | Language Input. Core Family. Ave | 0.03 | 0.16 | 0.01 | 2.37 | 0.018 |
| SES | > | Traditional Materials. Ave | 0.07 | 0.31 | 0.01 | 4.66 | *** |
| SES | > | Digital media Materials. Ave | −0.01 | −0.14 | 0.01 | −2.07 | 0.038 |
| SES | > | Traditional Activities. Ave | 0.05 | 0.20 | 0.01 | 3.10 | 0.002 |
| SES | > | Digital media Activities. Ave | −0.01 | −0.06 | 0.01 | −0.91 | 0.362 |
| Language | > | Traditional Materials. Ave | −0.81 | −0.42 | 0.09 | −8.69 | *** |
| Language | > | Digital media Materials. Ave | −0.15 | −0.17 | 0.05 | −3.12 | 0.002 |
| Language | > | Traditional Activities. Ave | −0.90 | −0.43 | 0.10 | −8.72 | *** |
| Language | > | Digital media Activities. Ave | −0.78 | −0.47 | 0.08 | −9.57 | *** |

***$p < 0.001$, $X^2(14) = 25.216$, $p = 0.032$, CFI = 0.979, TLI = 0.934, RMSEA = 0.05. B refers to estimate of unstandardized regression coefficients/weights, SE refers to approximate standard error, $\beta$ refers to estimate of standardized regression coefficients/weights, and C.R. refers to critical ratio ($t$ value).

was. In contrast, the amount of digital media materials that a family possessed was significantly and negatively correlated with familial SES. In other words, children from lower-SES families possessed more digital media materials. In terms of language, the results reveal that children possessed more English materials and engaged in more activities in English than in Mandarin, and such "English dominance" applied for both conventional and digital media modalities. The model demonstrated good model fit, $X^2(14) = 25.216$, $p = 0.032$, CFI = 0.979, TLI = 0.934, RMSEA = 0.05.

We did further analysis with items on parents' perceived importance of digital media for children (i.e., to 'Improve language and other skills', for "Entertainment," for "Communication" and for parents) ("Keep child occupied," "Distract or divert child's attention," "Put child to sleep"). As with the previous SEM model, the latent "SES" factor and language (i.e., English vs. Mandarin) were used to predict children's and parental perceived digital media importance. The results (Table 4) reveal that both familial SES and language could significantly affect perceived importance of digital media: the lower the familial SES was, the higher the perceived digital media importance was. In terms of language, both parents and children had higher perceived digital media importance in English than in Mandarin.

## 4. Discussion

This study examined (1) whether bilingual children's home language environment has been affected by COVID-19 and (2) to what extent familial SES and language status (i.e., societal dominant language vs. mother tongue language) would influence children's home language environment. Based on the literature review and the bilingual situation in Singapore, we proposed the following hypotheses: (1) both conventional and digital media input environment were expected to be affected. Specifically, children might have an increased proportion of Mandarin input since COVID-19, and they might have more digital media resources and activities in both languages and (2) children from higher-SES families were expected to enjoy better language environment in terms of resources and activities, and their English language environment was better than that of Mandarin. Our results have partially confirmed both hypotheses. For the first hypothesis, we found that children had significantly more materials and activities in both languages and both modalities (i.e., for both conventional and digital media) since COVID-19. However, the language input pattern of core family members had not been

TABLE 4 The results of structural equation modeling on perceived digital media importance.

| Path | | | *B* | *β* | S.E. | C.R. | *p* |
|---|---|---|---|---|---|---|---|
| SES | > | Household Income | 1.00 | 0.59 | | | |
| SES | > | Father Education Level | 0.16 | 0.66 | 0.02 | 7.08 | *** |
| SES | > | Mother Education Level | 0.11 | 0.66 | 0.02 | 7.09 | *** |
| SES | > | Parent. Importance. Ave | −0.09 | −0.39 | 0.02 | −5.33 | *** |
| SES | > | Child. Importance. Ave | −0.05 | −0.25 | 0.01 | −3.57 | *** |
| Language | > | Parent. Importance. Ave | −0.37 | −0.19 | 0.10 | −3.63 | *** |
| Language | > | Child. Importance. Ave | −0.35 | −0.19 | 0.10 | −3.53 | *** |

***$p < 0.001$, X2(7) = 4.026, $p = 0.777$, CFI = 1, TLI = 1.027, RMSEA = 0.00.

changed by COVID. For the second hypothesis, we found familial SES indeed impacted children's dual language environment at home. Higher-SES families held more materials and conducted more activities in the conventional format (e.g., the number of paper books), while lower-SES families possessed more digital media materials. Children in general have significantly more English materials and activities than that of Mandarin Chinese. We discuss our results about the two hypotheses as follows.

## 4.1. The impact of COVID-19 pandemic on bilingual children's home language environment

Our results for the first research question indicate that COVID-19 has indeed brought changes to bilingual children's home language environment. Being in line with other studies (e.g., Sheng et al., 2021; Sonnenschein et al., 2021), we also found that there is a significant increase in children's language input richness. Both in English and Mandarin, children possessed more materials and engaged in more activities, either in the conventional format (e.g., educational board games) or in the digital format (e.g., eBooks). Shift to work-from-home practices allowed parents to spend more time with their children, and many parents can gain a greater awareness of their children's language status. With this knowledge, they may have turned to educational resources and spent more quality time with their children to boost their children's language abilities. However, significant increase in digital media resources and activities might also be due to family stress. When parents were fully occupied or felt exhausted, digital devices provided an avenue for children to explore independently, relieving some stress from parental care (Hartshorne et al., 2021). Follow-up studies need to explore parents' motivation in engaging more digital media devices, distinguishing those who deliberately engage digital resources for educational purposes from those who treat screen devices as convenient babysitters. Parental intentions may lead to different outcomes in children's language, literacy, and cognitive development. As previous research has pointed out, the effect of digital activity on children's language skills depends on how engaging the material is. Digital activity that encourages good parent–child interactions as when conventional materials are used are more effective than having a child passively absorb language-relevant information (Florit et al., 2021). As such, promotion of digital activity for children should consider digital interactions that resemble responses and replies. Moreover, the content and the design of digital media also plays a role in its effectiveness in language promotion. For instance, digital books must caution from distracting elements that do not align with the storyline to achieve the same outcomes as printed books (Furenes et al., 2021), reemphasizing the importance of being selective with digital media for improving children's language skills.

Different from previous findings (i.e., Sheng et al., 2021), however, we have not seen the changes in children's language input pattern from core family members. In Sheng et al., 2021 study on English-Mandarin bilingual families in the US, Mandarin was found to be used more often between parents and children in the COVID-19 cohort than the pre-COVID cohort, which the authors addressed by identifying congruence with Serratrice's (2020) finding of "elevated use of the home language in bilingual children of comparable age during lockdown" (p. 7). The discrepancy between our finding and Sheng et al., (2021) might be due to sampling strategy and parental language backgrounds. First of all, Sheng and colleagues compared two groups of children, one before COVID-19 and one since COVID-19, while the current study compared the experiences of one group of children before and since COVID-19. Engaging two samples at different time points bring in additional contextual factors (e.g., employment status) which potentially affect parents' language use at home. Second, in Sheng et al.'s (2021), study all parents considered Mandarin as the language they spoke when growing up, however, both English and Mandarin could be the dominant language of the young parents in our study, given that bilingual education has been promoted in Singapore since 1967 and many families in Singapore are English-dominant nowadays (Sun et al., 2018b, 2021). Therefore, even though the parents in our study spent more time with their children since COVID-19, they may still prefer to speak in English, and they may persist with this language pattern with their children. In correspondence, their children would respond to their parents in a similar style. As such, Mandarin language use did not see a greater increase as compared to the use of English.

## 4.2. SES and language in bilingual children's home language environment

Our results for the second research question were aligned with previous findings on the discrepancy between English and Mandarin environment (Sheng et al., 2021; Song et al., 2022). The core family members tended to speak more English than Mandarin to the children, and the households in general possessed significantly more resources in English than in Mandarin. In relation to these findings, children also

engaged in more activities in English as opposed to activities in Mandarin. This consistent finding can be attributed to similar reasons other researchers have proposed: the lack of Mandarin learning materials, the social status of English and its importance in the whole education system, and children's social demand for English with their peers.

Our second hypothesis in relation to familial SES has not been fully supported. Based on the literature, higher-SES families would have more disposable income on various materials, which in turn, would favorably impact their children's language and literacy development. Therefore, we hypothesized that higher-SES families would have more resources in both conventional and digital media formats. However, this study found that higher-SES families seemed more willing to spend money and time on conventional materials and activities but were reluctant to employ digital media materials. This might be due to parents' and children's attitudes toward digital media. The result of parental perceived digital media importance implies that higher-SES families may have less trust or more concerns about using digital media, and they still prefer traditional approaches (e.g., paper book reading) that have stood the test of time, such as magnetic letters games. Moreover, the finding that greater weight was given for the importance of digital media for English use rather than Mandarin use lends support to how English is viewed to hold a stronger status in society. Even though digital media was viewed as more important for English, higher-SES families were still less willing to use these and remained committed to conventional materials.

## 5. Conclusion

There are two critical limitations of the study. First, this is a retrospective study, therefore, parents' memory of their pre-COVID-19 home language environments might not be accurate. However, given the unpredictable nature of the pandemic, it is not possible to control the nature of the data we have collected. Second, the analysis was based on survey data, and there was no language assessment before the pandemic to allow us to explore the impact of such environment change on children's dual language performance. However, given the consistent finding on the impact of children's home language environment on their language and literacy scores worldwide (Paradis, 2011; Paradis et al., 2020) and in the local context (e.g., Sun et al., 2018a,b, 2020, 2022a,b,c; Sun and Yin, 2022), we have good reason to believe that the change of children's language will cause a ripple effect on their language skills longitudinally. Despite these limitations, the study demonstrates the impact of COVID-19 on children's language input richness at home. Parents engaged significantly more educational resources and activities since COVID-19, which probably cast a positive impact on children's language learning. However, the study has also found discrepancies of the richness between languages and families with different SES. It is possible that Singaporean children might receive a boost to their English proficiency and have weaker mother tongue skills in the post COVID-19 era. This deserves more attention from policymakers, educators, and researchers, especially for the preservation of heritage languages.

## Data availability statement

The datasets for this study will not be made publicly available because of the privacy contract signed with the participants. Requests to access these datasets should be directed to the corresponding author.

## Ethics statement

The studies involving human participants were reviewed and approved by Nanyang Technological University. Written informed consent to participate in this study was provided by the participants' legal guardian/next of kin.

## Author contributions

HS designed the work, analyzed the data, interpreted the results, and wrote the manuscript. JT assisted to analyze the data and contributed to the writing of the introduction section. WC contributed to the writing of the discussion section and helped to proofread the manuscript. All authors contributed to the article and approved the submitted version.

## Funding

This study was funded by Singapore Ministry of Education (MOE) under the Education Research Funding Program (OER 13/19 HS) and administered by National Institute of Education (NIE), Nanyang Technological University, Singapore. Any opinions, findings, and conclusions or recommendations expressed in this material are those of the author(s) and do not necessarily reflect the views of the Singapore MOE and NIE.

## Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

## Publisher's note



## References

Aryadoust, V., and Liu, S. (2015). Predicting EFL writing ability from levels of mental representation measured by Coh-Metrix: a structural equation modeling study. *Assess. Writ.* 24, 35–58. doi: 10.1016/j.asw.2015.03.001

Bedore, L., Pena, E., Griffin, Z., and Hixon, J. (2016). Effects of age of English exposure, current input/output, and grade on bilingual language performance. *J. Child Lang.* 43, 687–706. doi: 10.1017/S0305000915000811

Cavallaro, F., and Ng, B. C. (2014). "Language in Singapore: from multilingualism to English plus" in *Challenging the Monolingual Mindset*. eds. J. Hajek and Y. Slaughter (London: CPI Group), 33–48.

Chia, M. Y. H., Tay, L. Y., and Chua, T. B. K. (2020). Quality of life and meeting 24-h WHO guidelines among preschool children in Singapore. *Early Childhood Educ. J.* 48, 313–323. doi: 10.1007/s10643-019-00987-9

Courage, M. L. (2017). "Screen media and the youngest viewers: implications for attention and learning" in *Cognitive Development in Digital Contexts*. eds. F. C. Blumberg and P. J. Brooks (New York, NY: Academic Press), 3–28.

De Houwer, A. (2007). Parental language input patterns and children's bilingual use. *Appl. Psycholinguist.* 28, 411–424. doi: 10.1017/S0142716407070221

Dolean, D. D. (2022). Home literacy practices that support language and literacy development in bilingual children: a longitudinal case study. *Int. J. Biling. Educ. Biling.* 25, 2621–2635. doi: 10.1080/13670050.2021.1943304

Ebert, S., Lehrl, S., and Weinert, S. (2020). Differential effects of the home language and literacy environment on child language and theory of mind and their relation to socioeconomic background. *Front. Psychol.* 11:2321. doi: 10.3389/fpsyg.2020.555654

Florit, E., Barachetti, C., Majorano, M., and Lavelli, M. (2021). Home language activities and expressive vocabulary of toddlers from low-SES monolingual families and bilingual immigrant families. *Int. J. Environ. Res. Public Health* 18:296. doi: 10.3390/ijerph18010296

Furenes, M. I., Kucirkova, N., and Bus, A. G. (2021). A comparison of children's reading on paper versus screen: a meta-analysis. *Rev. Educ. Res.* 91, 483–517. doi: 10.3102/0034654321998074

Hartshorne, J. K., Huang, Y. T., Paredes, P. M. L., Oppenheimer, K., Robbins, P. T., and Velasco, M. D. (2021). Screen time as an index of family distress. *Curr. Res. Behav. Sci.* 2:100023. doi: 10.1016/j.crbeha.2021.100023

Healey, A., Mendelsohn, A., Childhood, C. O. E., Sells, J. M., Donoghue, E., Earls, M., et al. (2019). Selecting appropriate toys for young children in the digital era. *Pediatrics* 143:e20183348. doi: 10.1542/peds.2018-3348

Hoff, E. (2006). How social contexts support and shape language development. *Dev. Rev.* 26, 55–88. doi: 10.1016/j.dr.2005.11.002

Hoff, E. (2013). Interpreting the early language trajectories of children from low-SES and language minority homes: implications for closing achievement gaps. *Dev. Psychol.* 49, 4–14. doi: 10.1038/a00

Kanero, J., and Aktan-Eryciyes, A. S. L. I. (2021). *PArental Contributions to Language Development During the COVID-19*. doi: 10.31234/osf.io/wvbjd

Kenny, D. A., and McCoach, D. B. (2003). Effect of the number of variables on measures of fit in structural equation modeling. *Struct. Equ. Model.* 10, 333–351. doi: 10.1207/S15328007SEM1003_1

King, C. J., Lee, A., Zuk, J., Ravi, N., and Gaab, N. (2020). *The COVID-19 Home Environment Literacy Practices (COVID19-HELP) Questionnaire* OSF Preprints. doi: 10.31219/osf.io/2bjhd

Klem, L. (2000). "Structural equation modeling" in *Reading and Understanding MORE Multivariate Statistics*. eds. L. G. Grimm and P. R. Yarnold (Washington, DC: American Psychological Association), 227–260.

Luo, R., Pace, A., Levine, D., Iglesias, A., de Villiers, J., Golinkoff, R. M., et al. (2021). Home literacy environment and existing knowledge mediate the link between socioeconomic status and language learning skills in dual language learners. *Early Child. Res. Q.* 55, 1–14. doi: 10.1016/j.ecresq.2020.10.007

Madigan, S., McArthur, B. A., Anhorn, C., Eirich, R., and Christakis, D. A. (2020). Associations between screen use and child language skills: a systematic review and meta-analysis. *JAMA Pediatr.* 174, 665–675. doi: 10.1001/jamapediatrics.2020.0327

McDaniel, S. C., McLeod, R., Carter, C. L., and Robinson, C. (2017). Supplemental summer literacy instruction: implications for preventing summer reading loss. *Read. Psychol.* 38, 673–686. doi: 10.1080/02702711.2017.1333070

Mendelsohn, A. L., Berkule, S. B., Tomopoulos, S., Tamis-LeMonda, C. S., Huberman, H. S., Alvir, J., et al. (2008). Infant television and video exposure associated with limited parent-child verbal interactions in low socioeconomic status households. *Arch. Pediatr. Adolesc. Med.* 162, 411–417. doi: 10.1001/archpedi.162.5.411

Murrmann, J. M. (2021). Effects of the COVID-19 pandemic on multilingual families from a sociolinguistic perspective. *Socjolingwistyka* 35, 89–104. doi: 10.17651/SOCJOLING.35.6

Paradis, J. (2011). Individual differences in child English second language acquisition: comparing child-internal and child-external factors. *Linguist. Approaches Biling.* 1, 213–237. doi: 10.1075/lab.1.3.01par

Paradis, J., Soto-Corominas, A., Chen, X., and Gottardo, A. (2020). How language environment, age, and cognitive capacity support the bilingual development of Syrian refugee children recently arrived in Canada. *Appl. Psycholinguist.* 41, 1255–1281. doi: 10.1017/S014271642000017X

Singapore Department of Statistics (SDS) (2020). Population trends 2020. Available at: http://www.singstat.gov.sg/

Read, K., Gaffney, G., Chen, A., and Imran, A. (2021). The impact of COVID-19 on families' home literacy practices with young children. *Early Childhood Educ. J.* 50, 1429–1438. doi: 10.1007/s10643-021-01270-6

Sari, E., Bittmann, F., and Homuth, C. (2021). *Explaining inequalities of homeschooling in Germany during the first COVID-19 lockdown*. Available at: https://osf.io/vsdq4/download

Seguin, D., Kuenzel, E., Morton, J. B., and Duerden, E. G. (2021). School's out: parenting stress and screen time use in school-age children during the COVID-19 pandemic. *J. Affect. Disord. Rep.* 6:100217. doi: 10.1016/j.jadr.2021.100217

Serratrice, L. (2020). *Languages in Lockdown: Time to Think About Multilingualism*. The ESRC International Centre for Language and Communicative Department. Available at: http://www.lucid.ac.uk/news-events-blog/blogs/languagesin-lockdown-time-to-think-about-multilingualism/

Sheng, L., Wang, D., Walsh, C., Heisler, L., Li, X., and Su, P. L. (2021). The bilingual home language boost through the lens of the COVID-19 pandemic. *Front. Psychol.* 12:667836. doi: 10.3389/fpsyg.2021.667836

Song, L., Sheng, L., and Luo, R. (2022). Comprehension skills of Chinese-English dual language learners: relations across languages and associations with language richness at home. *Int. J. Biling. Educ. Biling.*, 1–19. doi: 10.1080/13670050.2022.2137386

Sonnenschein, S., Stites, M., and Ross, A. (2021). Home learning environments for young children in the U.S. during COVID-19. *Early Educ. Dev.* 32, 794–811. doi: 10.1080/10409289.2021.1943282

Sun, H. (2019). Home environment, bilingual preschooler's receptive mother tongue language outcomes, and social-emotional and behavioral skills: one stone for two birds? *Front. Psychol.* 10:1640. doi: 10.3389/fpsyg.2019.01640

Sun, H., Bornstein, M. H., and Esposito, G. (2021). The specificity principle in young dual language learners' English development. *Child Dev.* 92, 1752–1768. doi: 10.1111/cdev.13558

Sun, H., Lim, V., Low, J., and Kee, S. (2022a). The development of a parental questionnaire (QQ-MediaSEED) on bilingual children's quantity and quality of digital media use at home. *Acta Psychol.* 229:103668. doi: 10.1016/j.actpsy.2022.103668

Sun, H., Loh, J. Y., and Roberts, A. C. (2019). Motion and sound in animated storybooks for preschooler's total fixation time and mandarin language learning: an eye-tracking study with Singaporean bilingual children. *AERA Open* 5, 233285841984843–233285841984819. doi: 10.1177/2332858419848431

Sun, H., and Ng, E. (2021). Home and school factors in early English language education. *Asia. Pac. J. Educ.* 41, 657–672. doi: 10.1080/02188791.2021.1932742

Sun, H., Ng, S. C., O'Brien, B. A., and Fritzsche, T. (2020). Child, family, and school factors in bilingual preschoolers' vocabulary development in heritage languages. *J. Child Lang.* 47, 817–843. doi: 10.1017/S0305000919000904

Sun, H., Roberts, A. C., and Bus, A. (2022b). Bilingual children's visual attention while reading digital picture books and story retelling. *J. Exp. Child Psychol.* 215:105327. doi: 10.1016/j.jecp.2021.105327

Sun, H., Steinkrauss, R., Wieling, M., and de Bot, K. (2018a). Individual differences in very young Chinese children's English vocabulary breadth and semantic depth: internal and external factors. *Int. J. Biling. Educ. Biling.* 21, 405–425. doi: 10.1080/13670050.2016.1178706

Sun, H., Waschl, N., and Veera, R. (2022c). Language experience and bilingual children's heritage language learning. *Stud. Second. Lang. Acquis.* 44, 1356–1383. doi: 10.1017/S0272263121000942

Sun, H., and Yin, B. (2020). Digital media input and bilingual children's language learning. *Front. Psychol.* 1–11. doi: 10.3389/fpsyg.2020.02023

Sun, H., and Yin, B. (2022). Vocabulary development in early language education. *Handbook Early Lang. Educ.*, 57–82. doi: 10.1007/978-3-030-91662-6_3

Sun, H., Yin, B., Amsah, F., and O'Brien, B. A. (2018b). Differential effects of internal and external factors in early bilingual vocabulary learning: the case of Singapore. *Appl. Psycholinguist.* 39, 383–411. doi: 10.1017/S014271641700039X

Treviño, E., Miranda, C., Hernández, M., and Villalobos, C. (2021). Socioeconomic status, parental involvement, and implications for subjective well-being during the global pandemic of COVID-19. *Front. Educ.* 6:762780. doi: 10.3389/feduc.2021.762780

# Frontiers in Psychology

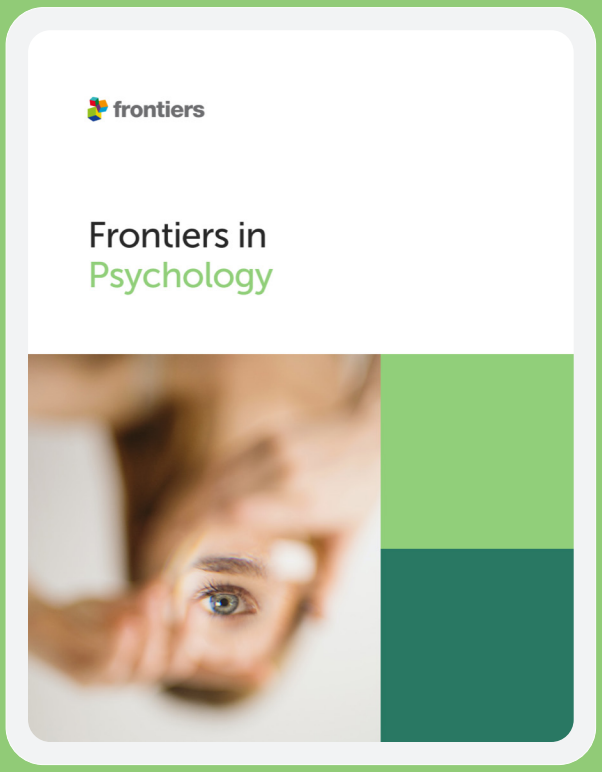
**Paving the way for a greater understanding of human behavior**

The most cited journal in its field, exploring psychological sciences - from clinical research to cognitive science, from imaging studies to human factors, and from animal cognition to social psychology.

---

## Discover the latest Research Topics

See more →




**Frontiers**

Avenue du Tribunal-Fédéral 34
1005 Lausanne, Switzerland
frontiersin.org

**Contact us**

+41 (0)21 510 17 00
frontiersin.org/about/contact