

The role of parental attitudes, home literacy environment, and migration background in preschool children's emergent literacy skills

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ABSTRACT

Developing proficient literacy skills is important for school success. This study examined the link between parental attitudes towards reading and preschool children's emergent literacy skills in German, focusing on children with and without migration background. It explored whether the Home Literacy Environment (HLE) mediated this relation while controlling for child age, sex, cognitive skills, and family socioeconomic status. The study involved 500 children ($M_{age} = 60.97$ months) assessed three times across a year. The results showed that parental attitudes towards reading influenced emergent literacy skills only through the HLE. Migration background had an indirect effect, with the HLE mediating its impact on literacy development. These findings highlight the critical role of the HLE in fostering literacy skills, provide a plausible explanation for individual differences in German emergent literacy skills for children with and without migration background, and suggest that interventions targeting parental attitudes and HLE may effectively support literacy development.

Introduction

Developing emergent literacy skills at a young age is crucial, as they predict later reading, spelling, and reading competencies in primary school (Kam Tse et al., 2017; Sénéchal & LeFevre, 2002), and thus are essential for a successful school career (Storch & Whitehurst, 2002). However, children without migration background who are proficient in the language of instruction often outperform their peers with migration background in their literacy skills (Eisenwort et al., 2018). Children with a migration background tend to speak other languages at home than the language of instruction. The use of different languages at home might not only impact the learning environment parents provide to their children, but also children's literacy skills. Consequently, it is important to identify which factors impact preschool children's German emergent literacy skills to reduce individual disparities.

The Home Literacy Environment (HLE) as a multidimensional construct encompasses all the experiences, materials, and activities related to reading, writing, and language development that take place within the home setting (Sénéchal et al., 1998). Parental attitudes towards reading play a vital role in shaping the HLE (Alramamneh et al., 2023; Niklas et al., 2020), as parents who view reading positively tend to

offer a higher quality HLE, which fosters children's literacy development. However, the specific relations between parental attitudes towards reading and the different aspects of the HLE such as its formal and informal facets have rarely been investigated simultaneously (Altun et al., 2022; Niklas et al., 2020). Furthermore, the associations between parental attitudes, formal and informal HLE, and German emergent literacy skills are still unclear, especially for children with migration background. Consequently, identifying family-related predictors of German literacy skills for children with and without migration background is an important task to reduce social disparities by supporting children's literacy learning.

Preschool emergent literacy skills

Emergent literacy encompasses skills and knowledge that children acquire before formal instruction and that are precursors of later reading and spelling abilities (Niklas & Schneider, 2017a). Longitudinal studies have demonstrated that emergent literacy skills and later language abilities lie in a continuum (Ennemoser et al., 2012; Niklas & Schneider, 2013, 2017a; Sénéchal & LeFevre, 2002), explaining the relations between emergent literacy skills and later literacy development.

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According to the model of child development and emergent literacy by Whitehurst and Lonigan (1998), there is a distinction made between “inside-out skills” and “outside-in skills”. Inside-out skills refer to language analytical skills, and focus on language symbols that are necessary for reading, especially phonological awareness (PA) and letter knowledge, as these skills allow the grapheme-phoneme translation. PA represents the ability to recognize the structure of language and to manipulate sound patterns (Sénéchal et al., 2004). Enhancing decoding skills initiates the process of acquiring letter knowledge, and thus achieving fluent reading (Konerding et al., 2020). Here, letter knowledge, which is defined as knowledge of the alphabet (Whitehurst & Lonigan, 1998), is also important for the early acquisition of grapheme-phoneme relations (Carr et al., 2020).

On the contrary, outside-in skills, such as vocabulary, refer to the skills that children need for reading comprehension (i.e., understanding the written context). Vocabulary knowledge consists of various components such as productive and receptive vocabulary, semantic features, and lexical organization (Nagy & Scott, 2000).

Home literacy environment and children’s literacy development

The close association between the HLE and children’s literacy development has been widely explored in different countries (for a comparative study of 25 countries, see Park, 2008; for countries in Asia, see Cheung et al., 2021; Kam Tse et al., 2017; Lai et al., 2022; Zhang, Inoue, & Georgiou, 2023; Zhang et al., 2023) and across languages with different orthographic consistency (Inoue et al., 2020). A high-quality HLE fosters literacy by providing resources and learning opportunities, such as shared reading activities, storybook exposure, and parental teaching and support in learning (Niklas, 2015). According to ecological (Bronfenbrenner, 1979) and sociocultural theories (Vygotsky et al., 1980), parent-child interactions and everyday learning habits in families are crucial for the development of literacy skills at an early age (Wirth et al., 2022). These theories describe different social environments as systems that can facilitate children’s learning through interactions. The family is part of children’s microsystem (i.e., the system in which direct activities and parent-child interactions occur and social roles can be observed) and provides opportunities within the HLE for such interactions to happen (Bronfenbrenner, 1979). These assumptions are supported by empirical research (Niklas & Schneider, 2017b; Sénéchal & Young, 2008). Further, findings of meta-analyses (Mol et al., 2008; Zhang et al., 2023) indicate that children who grow up in a high quality HLE develop greater literacy skills and are more effectively prepared for school.

Despite research on the HLE, a clear conceptualization of this construct is still lacking (e.g., Lehl et al., 2020), and thus, the specific mechanisms of the HLE that influence children’s learning are still unclear. An internationally well-established HLE model was proposed by Sénéchal and LeFevre (2002). According to this model, the multifaceted HLE is based on two broad dimensions: formal (or code-related) and informal (or meaning-related) practices.

Formal practices include explicit and direct parental teaching of letter names, letter sounds, name writing, and word reading (Inoue et al., 2020; Krijnen et al., 2020). On the contrary, informal practices promote implicit learning through activities like shared book reading, fostering, for example, children’s vocabulary, language growth, emergent literacy, and reading achievement (e.g., Inoue et al., 2020; Lenhart et al., 2022; Torppa et al., 2022; for meta-analyses, see Dowdall et al., 2020; Fitton et al., 2018). Despite extensive research, gaps remain in our understanding how different dimensions of the HLE contribute to literacy outcomes across families with diverse backgrounds (e.g., Lehl et al., 2020).

Parental attitudes towards reading, the home literacy environment, and children’s literacy development

Not only the HLE but also parental attitudes towards reading are crucial in the early years of children’s literacy development. In their model, Rosenberg et al. (1960) proposed three distinct aspects of attitudes: cognitive, affective, and behavioral. Parents who view reading as valuable (cognitive) and enjoyable (affective) are more likely to provide literacy-rich experiences (behavioral) for their children (Niklas et al., 2020). Research suggests that parents with positive attitudes towards literacy learning contribute to more positive reading attitudes in their children (Altun et al., 2022; Swalander & Taube, 2007) and provide a HLE of higher quality (Bingham, 2007; Weigel et al., 2006).

Although the role of parental attitudes in children’s literacy development seems clear, the relations between parental attitudes, HLE, and children’s emergent literacy skills have been scarcely considered in current research (for an exception, see Niklas et al., 2020), especially for preschool children. Whereas some studies considered parental attitudes as a part of the HLE (Valcárcel Jiménez et al., 2024; Niklas & Schneider, 2017b), others examined them separately (Alramamneh et al., 2023; Lai et al., 2022; Niklas et al., 2020; Park, 2008) or did not take them into consideration at all (Inoue et al., 2020; Novita et al., 2022). For this study, we modeled parental attitudes as a predictor of the HLE, as the value parents attribute to reading might influence their behavior and thus the home learning opportunities parents provide to their children (Niklas et al., 2020). Additionally, structural factors, such as socioeconomic status (SES), intersect with parental attitudes and the HLE, and should thus be considered in the context of children’s developing literacy skills (Attig & Weinert, 2020; Luo et al., 2021; Niklas et al., 2020). Other structural factors, such as migration background, have been less frequently considered in the relation between HLE and emergent literacy skills, although studies identified migration background as an important predictor of both (Novita & Kluczniok, 2022).

Migration background

Migration background and literacy development in Germany

The achievement gap in German literacy skills between children with and without migration background is well known, not only in primary school (see results of the Progress in International Reading Literacy Study [PIRL]), but also in secondary school (see results of the Programme for International Student Assessment [PISA], Mang et al., 2023). Here, children without migration background tend to achieve higher outcomes compared to their peers with migration background.

Similar patterns are found for preschool children with children without migration background often exhibiting higher proficiency levels in German emergent literacy skills, such as PA or vocabulary, in comparison to their peers with migration background (Dubowy et al., 2008; Fröhlich et al., 2013; Novita & Kluczniok, 2022). This variation can be partly attributed to differences in the time available for first and second language learning among children with migration background (Butler & Hakuta, 2008), which may lead to challenges in acquiring vocabulary in both languages (Eisenwort et al., 2018).

Children with a family language other than the language of instruction in preschool and school often show poorer linguistic outcomes in the majority language (e.g., Niklas & Schneider, 2013). Consequently, children with migration background may encounter additional challenges in preschool and primary school, including a higher likelihood of experiencing delayed school entry compared to children without migration background (Tuppat et al., 2016).

Migration background, parental attitudes towards reading, and the home literacy environment

In this context, the differences in German literacy development

between children with and without migration background highlight the crucial significance of parental attitudes and the HLE as the primary literacy learning environment for young children. As Fig. 1 shows, family background characteristics can shape the quality and quantity of learning experiences available to children within the home environment (Niklas & Schneider, 2017a; Novita & Klucznik, 2022).

While prior research has explored the association between SES and HLE on children's emergent literacy skills (for research on English emergent literacy skills, see Zhang et al., 2023; Lai et al., 2022; Luo et al., 2021), less is known about the interplay between parental attitudes and HLE in children's German literacy development, particularly with German as children's second language. This gap is especially relevant given that HLE research has often focused on the development of children's literacy skills in the instructional language (i.e., majority language) without accounting for the diverse linguistic and cultural backgrounds of children. Consequently, less is known about the role of the HLE in supporting and facilitating children's second language development (Zhang et al., 2023).

Research on formal and informal aspects of the HLE of preschool children with migration background is still in its early stages. Here, results of multigroup analyses revealed that children with migration background in Germany were less exposed to informal, but more exposed to formal activities of the HLE (Novita & Klucznik, 2022). More research that differentiates between these two HLE domains is needed to expand the knowledge about cultural and structural variations in families' learning environments.

Children's proficiency in the instruction language might also be associated with the beliefs and values their parents ascribe to language. Depending on their background, families may emphasize different aspects of learning, with some prioritizing formal education and academic achievement and others focusing more on social education or practical life skills (see also Niklas et al., 2018). Cross-national studies reveal that the impact of parental attitudes and HLE on literacy varies across cultural contexts. For instance, Park (2008) found significant differences across countries concerning the influence of parental attitudes towards literacy, the HLE, and the number of books at home on children's reading proficiency in Grade 4. Consequently, the influence of parental attitudes and HLE on children's German literacy skills might differ for children with and without migration background.

Given the growing number of families with migration background in Germany, research on potentially varying parental attitudes based on migration background and their joint association with HLE on children's German literacy development is essential. This understanding can help address language barriers and social inequities while empowering families and policymakers with insights into how these factors support children's German emergent literacy skills. Such knowledge is key to providing early support, particularly for children who may benefit from additional resources to develop strong literacy foundations in the German language. Understanding these nuances can inform culturally

responsive literacy initiatives.

Research questions and hypotheses

The benefits of a high-quality HLE, that is a HLE with frequent literacy experiences for children such as shared reading, for the development of literacy skills have been thoroughly investigated in different countries (e.g., Mol et al., 2008; Park, 2008; Sénéchal & LeFevre, 2002). Although international literacy studies indicate that children with migration background often show less proficient literacy skills in the instruction language compared to their peers without migration background (Lewalter et al., 2023; McElvany et al., 2023), not much is known about the differences between families with and without migration background concerning parental attitudes towards reading, the HLE they provide to their children, and their associations with German literacy development. As a result, there is a significant gap in evidence-based understanding of how family factors are related to the support preschool children experience in their German emergent literacy skill development. Consequently, it is important to understand how parental attitudes towards reading as well as the formal and informal dimensions of the HLE are associated with children's German literacy skills. Since the German school system is entirely based on the German language as the primary medium of communication and education, and German literacy skills are therefore particularly relevant for children's academic development, our goal was to assess the German literacy skills with which children enter the educational system, regardless of their background.

Based on previous work (e.g., Niklas et al., 2020), we considered the role of migration background in the relations between parental attitudes, the HLE, and children's German literacy development. Moreover, we investigated both formal and informal aspects of the HLE instead of accentuating the distinction between cultural praxis and cultural capital. We also assessed and separately analyzed not only outside-in but also inside-out emergent literacy skills of preschoolers instead of a general measurement of kindergarten children's German language comprehension and production skills, using a larger and older sample, thus considering the limitations and recommendations Niklas et al. (2020) addressed in their discussion. With our approach, we tested the following hypotheses:

H1a: Parents without migration background show more positive attitudes towards reading (e.g., Park, 2008).

H1b: Children with migration background experience a higher quality formal HLE and a lower quality informal HLE compared to children without migration background (e.g., Novita & Klucznik, 2022).

H1c: Children with migration background show less proficient German emergent literacy skills compared to children without migration background (e.g., Dubowy et al., 2008; Fröhlich et al., 2013; Novita & Klucznik, 2022).

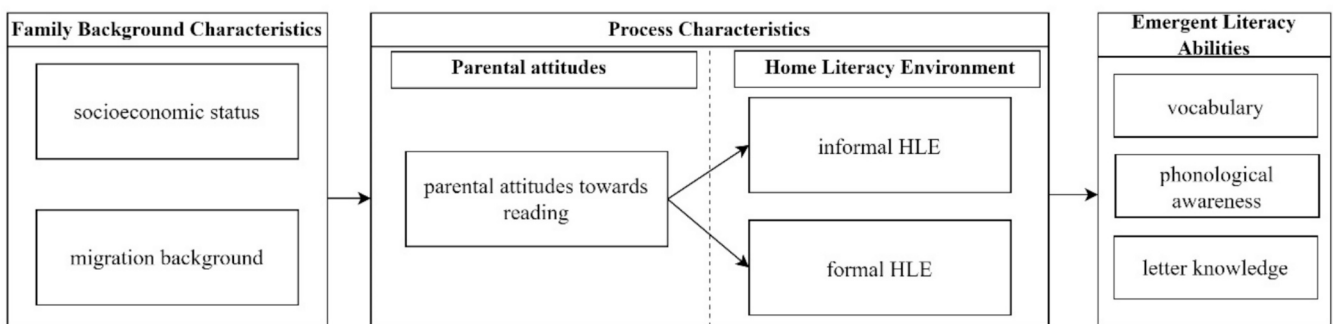


Fig. 1. Model for the Associations of Family Background and Process Characteristics with Emergent Literacy Skills.

Note. Based on Niklas et al. (2020). HLE = Home Literacy Environment. Home language can be used as a proxy for migration background and parental education, occupation, and income as a proxy for socioeconomic status.

H2: Parents with more positive attitudes towards reading provide a higher quality HLE and their children show better German emergent literacy skills (e.g., Niklas et al., 2020).

H3a: Children who live in a higher quality HLE show better German emergent literacy skills (e.g., Valcárcel Jiménez et al., 2024).

H3b: The formal HLE usually encompasses code-related activities, whereas the informal HLE comprises meaning-related activities. Consequently, the formal HLE should be a stronger predictor for letter knowledge and PA, whereas the informal HLE should be a stronger predictor for vocabulary in the German language (e.g., Krijnen et al., 2020).

H4: The association between parental attitudes towards reading and children's German emergent literacy skills should be fully mediated by both HLE dimensions (e.g., parents who show more positive attitudes provide a higher quality HLE, which in turn exerts a positive impact on children's German emergent literacy skills; e.g., Niklas et al., 2020).

H5: The association between migration background and German emergent literacy skills should be at least partially mediated by parental attitudes and both HLE dimensions.

Methods

Sample

Families participating in the study were recruited via the preschools their child attended, a social media campaign, telephone calls by a market research institute, and through personalized invitation letters that were sent with the support of the Government Department Administration Office of Munich. Written informed consent was provided by the parents and data assessment took place within the context of an apps-based intervention and large-scale longitudinal study in South Germany (Project Learning4Kids; Niklas, Annac, & Wirth, 2020; Niklas, Birtwistle, Wirth, Schiele, & Mues, 2022). This study was approved by the European Research Council Executive Agency and the ethics committee of the University of Munich.

Due to the Covid-19 pandemic, the sample had to be recruited in two cohorts. In total, 500 preschool children (cohort 1(t1) = 190 children, $M_{age} = 63.58$ months, $SD_{age} = 4.42$, 51 % female; cohort 2(t1) = 310 children, $M_{age} = 59.36$ months, $SD_{age} = 3.94$, 52 % female) and their families participated in the study.

Procedure

All child assessments were conducted by trained research assistants and took place in the families' homes on one day between June and August 2020 (cohort 1, t1) and between February and April 2021 (cohort 2, t1). The visits lasted approximately two hours and comprised assessments of child skills, while parents were asked to fill in a survey. Data assessments were conducted two more times every six months until the end of the final preschool year. Data at the end of the preschool year (t3) was available for 488 of the 500 children. No significant differences in any study variable (e.g., sex, age, SES, migration background, parental attitudes, formal and informal HLE) nor in literacy skills at t1 were found between children who discontinued their participation in the study and the children who participated until the end of preschool.

For the apps-based intervention between t1 and t3, the families were randomly assigned to one of four groups: 1 (literacy), 2 (numeracy), 3 (tablet-control), or 4 (business-as-usual control). For the purposes of this study, which controlled for the intervention, the families who received tablets with literacy and numeracy apps ($n = 302$) were classified as the intervention group (1), while those who received other types of apps or no tablet at all ($n = 198$) were considered the control group (0). However, as children and families were assigned to the different groups by randomization, all groups were very similar on average concerning children's literacy competencies and the percentage of families with a migration background. Moreover, the literacy intervention was

similarly successful for children with and without migration background (Niklas et al., 2025) and no meaningful associations for groups assignment and outcomes were expected. However, we still controlled for group assignment in our analyses (see statistical analyses).

The study was not pre-registered; however, the data analysis coding is available at OSF: https://osf.io/vekdj/?view_only=f445686f157540f2ba29fdab53c49bad.

Test instruments

All descriptive statistics and measure of internal consistency are presented in Table 1 in the results section.

Parental survey

A parental survey (see parental survey in the supplemental materials) was used to assess family background characteristics as well as parental attitudes and family HLE. Before visiting the families, parents were asked which language they preferred for the parental survey. The survey was translated into the eleven most common spoken foreign languages in our sample (e.g., English, Turkish, Arabic, Russian, Vietnamese etc.) and families received surveys in the language they felt most comfortable with.

Parental Attitudes Towards Reading. Parents were asked how much they agreed with four statements on cognitive parental attitudes towards reading at t1 (e.g., "We like reading in our family.").

Home Literacy Environment. Both aspects of the HLE were assessed at t2. The informal HLE was assessed using nine questions about the onset and frequency of shared reading at home, the number of books at home, and the frequency of children's and parental reading. The formal HLE was measured using five items about emergent literacy teaching (e.g., "At home, I specifically explain my child letters and how to write them.").

Socioeconomic Status. We developed an index comprising the highest prestige of parental occupation, parents' highest educational qualification, and net household income at t1. This operationalization is consistent with the broad consensus among researchers on three key indicators of SES (parental income, parental education, and parental occupation, Duncan & Magnuson, 2003; Enslinger & Fothergill, 2003; Sirin, 2005).

Here, the Magnitude-Prestige Scale (Wegener, 1988) is based on 283 categories of the international standard classification of occupations (ISCO) according to socially recognized prestige of the individual occupations. The scale ranges from 20.00 (unskilled laborer) to 186.8 (physician). On average, the highest prestige score in a family from this sample was 101.03 ($SD = 36.47$), which indicates an above-average SES compared to other German samples (Niklas et al., 2020; Novita et al., 2022; Novita & Kluczniok, 2022). Around 66 % of the parents had a university degree or a higher qualification. About 23 % of the families earned 3419 € or more. The three indicators were z-transformed and averaged.

Migration Background. A migration background (here measured as "a language other than German was spoken at home") was reported for 41 % of the families in cohort 1 and 36 % of the families in cohort 2. In total, 38 % of the families in the sample had a migration background and 43 different languages (e.g., Croatian, Vietnamese, French, Turkish, Arabic, English, Chinese, Polish...) were spoken by the families with migration background in our sample. In 42 % of our families, the child or at least one of their parents was not born in Germany, which corresponds to the current figures for preschool and primary school children in Germany (Federal Statistical Office, 2024). For the analyses, we operationalized children's migration background using the languages spoken at home with a dummy variable (i.e., 0 = only German was spoken at home; 1 = at least one language other than German was spoken at home), as the spoken language at home is a good measure for migration background and should be strongly related to children's German emergent literacy skills.

Table 1
Descriptive Statistics for all Study Variables.

Variable	N	M	SD	Min	Max	Cronbach's α	McDonald's ω
Sex ^a	500	0.51		0	1		
Age	500	60.97	4.61	51	75		
Socioeconomic status ^b	500	-0.01	0.81	-2.76	1.37	.72	.74
- Highest prestige of the parental occupation	494	101.03	36.47	20.00	186.80		
- Parents' highest educational qualification	495	6	1.68	0	7		
- Net household income	495	7.47	3.01	0	11		
Migration background ^c	486	0.38		0	1		
Parental attitudes towards reading	500	2.96	0.78	0	4	.84	.88
- We like reading in our family	500	3.02	0.95	0	4		
- We talk about things we've read	497	2.38	0.96	0	4		
- Child interested in being read to	496	3.40	0.84	0	4		
- Reading is an important activity	496	3.07	0.99	0	4		
Informal home literacy environment ^b	499	-0.01	0.61	-2.03	1.76	.76	.86
- Onset of shared reading in (months old) ^d	485	10.13	10.21	0	72		
- Frequency of shared reading	486	2.71	0.85	0	4		
- Frequency children's reading	484	2.57	0.99	0	4		
- Parental reading on a working day ^e	454	23.01	14.91	0	120		
- Parental reading on the weekend ^e	468	32.06	22.10	0	180		
- Number of books at home (no e-books)	488	4.50	1.64	0	6		
- Number of children's books	488	4.72	1.35	0	6		
- Parent 1 printed reading	486	1.76	1.23	0	4		
- Parent 2 printed reading	481	1.52	1.31	0	4		
Formal home literacy environment	482	2.76	0.86	0.20	4	.75	.81
- Explain how to read	480	2.50	1.27	0	4		
- Explain the letters	481	3.16	1.06	0	4		
- Practice the alphabet	482	2.63	1.36	0	4		
- Recognize and read letter and words	482	3.20	1.07	0	4		
- Memorize poems, rhymes, and songs	478	2.09	1.34	0	4		
Intelligence	500	46.98	10.83	1	57		
Vocabulary ^b	488	0	0.93	-2.98	1.29	.95	.96
- Productive vocabulary	488	9.74	3.89	0	11	.79	.83
- Receptive vocabulary	488	81.51	19.25	15	107	.94	.95
Phonological awareness	488	6.75	2.69	0	11	.89	.92
- Rhyming	488	6.78	2.86	0	11	.83	.90
- Initial phoneme recognition	488	6.72	3.53	0	11	.90	.91
Letter knowledge	487	8.36	3.31	0	13	.92	.94
- Productive letter knowledge	487	7.26	3.75	0	13	.88	.90
- Receptive letter knowledge	487	9.45	3.33	0	13	.86	.92

Note. ^a boys = 0, girls = 1; ^b z-transformed; ^c family language, only German = 0, a language other than German = 1; ^d recoded. ^e in minutes.

Children's cognitive and emergent literacy skills

Children's general cognitive abilities were measured at t1. Emergent literacy skills were assessed at the end of preschool (t3) with an extensive battery of standardized tests in German.

Non-Verbal Intelligence. Children's general cognitive abilities were tested with the "Columbia Mental Maturity Scale" (Burgemeister et al., 1972). Here, children had to identify and select the one object out of five which did not fit with the other ones, and the total score of correct answers (maximum = 57) was entered in the dataset.

Productive and Receptive Vocabulary. To assess productive vocabulary, 15 items from the "Active Vocabulary Test for 3- to 5-Year-old Children – Revision" (AWST-R; Kiese-Himmel, 2005) were used. Children were required to name 15 picture cards, a total of four verbs (e.g., "throw") and 11 nouns (e.g., "lighthouse"). Nine sets (12 items per set) from the German version of the "Peabody Picture Vocabulary Test" (PPVT; Lenhard et al., 2015) were used to assess receptive vocabulary. For this test, children were presented with four pictures and had to point to the correct picture (e.g., "Point with your finger to foot"). Both tests were z-standardized and averaged.

Phonological Awareness. Two subtests of the "Würzburger Preschool Test" (WVT; Endlich et al., 2017) measuring PA were adapted (i. e., three additional, more difficult items were added) and applied. The first one was a rhyming task with 11 items. Children had to decide which of the four words which were also shown in pictures did not rhyme (e.g., "See—Tee—Tisch—Klee"). The second one was an initial phoneme identification task with 11 items. Children were asked to identify and name the first sound (e.g., "Nase" and "Nnnn...ase" as answer). Both

tests were z-standardized and averaged.

Productive and Receptive Letter Knowledge. Both receptive and productive letter knowledge were examined with subtests of the WVT (Endlich et al., 2017) and assessed with 13 items each. In the productive letter knowledge test, children had to actively name letters (e.g., "What is the name of this letter?" /Z/ as answer). Both, the letter sound and the letter name were accepted as correct answers. In the receptive letter knowledge test, children had to identify the correct letter among four letters presented to them (e.g., U-O-I-V. "Can you show me /O/?"). The receptive and productive letter knowledge tests were z-standardized and averaged.

Statistical analyses

Data analyses were conducted using R 4.3.0 (R Core Team, 2022). The fit of the measurement models for the latent variables (parental attitudes and HLE) was analyzed through confirmatory factor analysis (CFA) with robust maximum likelihood estimation (MLR). To evaluate the model fit, several goodness-of-fit indices were considered (Hu & Bentler, 1999): the root mean square error of approximation (RMSEA, $\leq .06$), the comparative fit index (CFI, $\geq .95$), and the standardized root mean squared residuals (SRMR, $\leq .08$). While we included the χ^2 -goodness-of-fit statistic in our report, it is worth noting that this measure can be overly sensitive to minor model misalignments and sample size (Chen, 2007). We considered modification indices consistent with theoretical principles to improve model fit (Schumacker & Lomax, 2010); however, no changes were necessary.

Additionally, we also tested measurement invariance for the latent constructs using multigroup confirmatory factor analyses (MCFA; French & Finch, 2008). For a meaningful interpretation of the constructs and for an accurate comparison between parents with and without migration background, it is essential to test whether these constructs are understood similarly by both groups.

To assess the presence of multicollinearity, variance inflation factor (VIF) and tolerance were calculated. VIF values greater than 5 and tolerance values less than 0.1 usually indicate multicollinearity (Stevens, 2009).

Latent structural equation models (SEM) were built using the lavaan R-package (Rosseel, 2012) to test the proposed model, while controlling for child age, sex, cognitive skills, and family SES. To estimate indirect and total effects, we calculated bias-corrected 95 %-confidence intervals (C.I.) by utilizing the bootstrap procedure with 1000 bootstrap draws (Mackinnon et al., 2004). The full information maximum likelihood method (FIML) was used as the estimation algorithm to account for missing values (Newman, 2014).

In our analyses, we controlled for potential effects of the intervention as well as possible cohort effects and their impact on children's literacy skills. Results of mean comparisons show that children from the second cohort were younger and their families had a higher SES, higher quality informal HLE, and more positive parental attitudes towards reading. They also showed higher vocabulary skills. Additionally, children in the intervention group showed significantly higher PA and letter knowledge skills. However, since the model fit did not change significantly after adding the variables "cohort" and "intervention" ($\Delta\chi^2(20) = 20.70, p = .415$), and all path coefficients remained very similar or unchanged, and following the parsimony principle, we therefore decided to exclude these variables from the final model (see Fig. 2).

Results

Descriptive and correlational analyses

Table 1 provides an overview of the descriptive statistics and Table 2 shows the correlations between the variables of parental attitudes at t1, HLE at t2, and emergent literacy skills at t3, as well as the other study variables.

Families without migration background had a higher SES and reported more positive parental attitudes towards reading. Their children generally showed higher performance in the vocabulary and PA tasks. Moreover, children without migration background lived in a lower quality formal HLE and in a higher quality informal HLE.

The formal and informal HLE were not significantly associated with each other. All German emergent literacy skills were positively inter-correlated, and more positive parental attitudes were also related to greater German emergent literacy skills. Parents with more positive attitudes towards reading provided a higher quality informal HLE, but not a higher quality formal HLE.

Girls were more frequently taught in literacy by their parents, indicated by a higher quality of the formal HLE. Families with younger children had a higher SES, and more positive attitudes towards reading and informal HLE. Also, a higher SES was associated with a higher quality informal HLE and children's literacy skills, but lower quality formal HLE. Cognitive abilities and German emergent literacy skills were also positively related.

Preliminary analyses

First, the fit of the measurement models for parental attitudes, and formal and informal HLE was evaluated using CFA (see Figs. S1 and S2 in

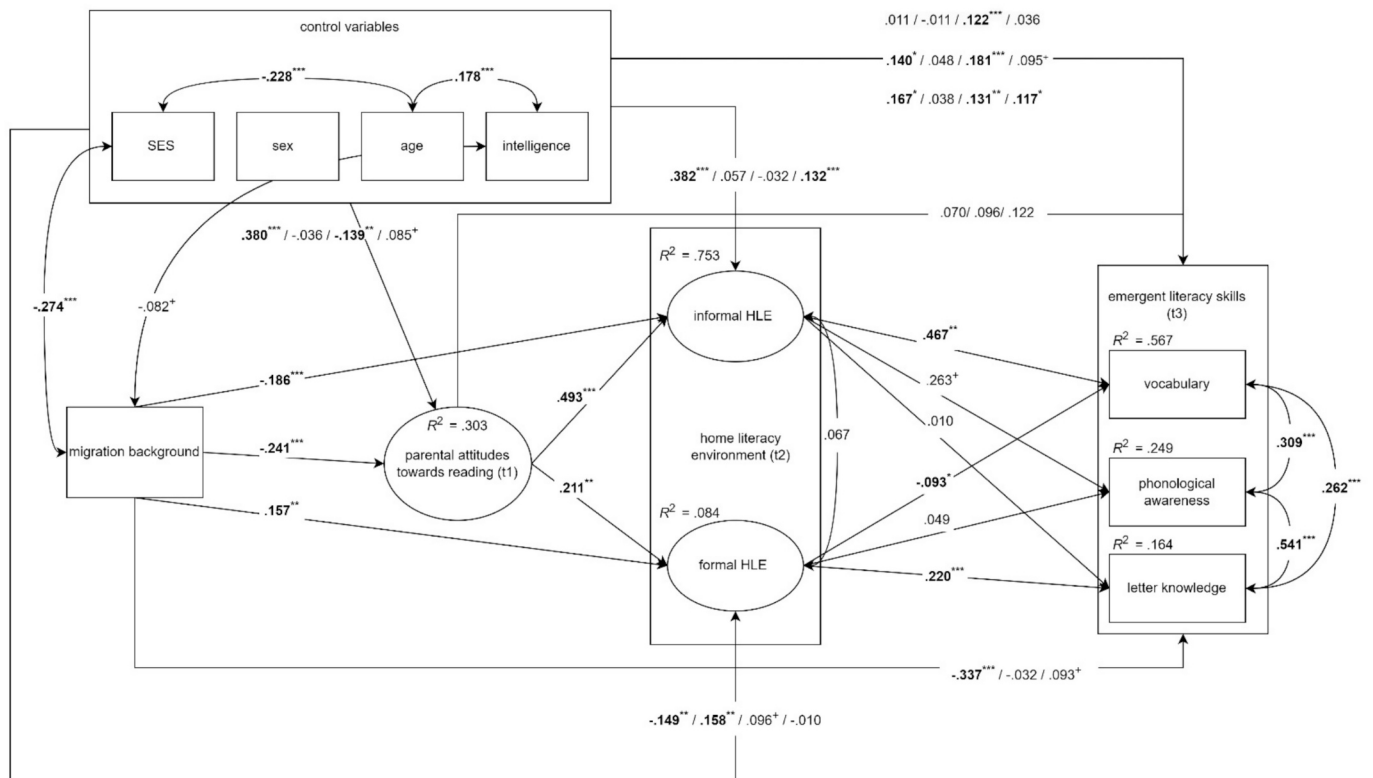


Fig. 2. Latent Structural Equation Model: The Role of Migration Background, Parental Attitudes Towards Reding, and Home Literacy Environment on German Emergent Literacy Skills.

Note. SES = socioeconomic status; HLE = home literacy environment. Migration background (0 = only German spoken at home; 1 = a language other than German spoken at home). Sex (0 = boys, 1 = girls). Significant paths are marked in bold.

$^{+}p < .10$. $^{*}p < .05$. $^{**}p < .01$. $^{***}p < .001$.

Table 2
Correlational Analyses.

	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Sex ^a (1)	—													
Age (2)	-.052	—												
SES ^b (3)	-.015	-.213**	—											
MB ^c (4)	-.015	.008	-.284**	—										
Att (5)	-.006	-.193**	.457**	-.324**	—									
iHLE (6)	.052	-.161**	.469**	-.334**	.593**	—								
fHLE (7)	.136**	.061	-.119**	.131**	.058	.078	—							
Cogn (8)	.126**	.150**	.117**	-.106*	.115**	.162**	.004	—						
pVocab (9)	.053	-.046	.432**	-.597**	.457**	.453**	-.131**	.160**	—					
rVocab (10)	-.046	.040	.410**	-.516**	.429**	.431**	-.143**	.245**	.728**	—				
rPA (11)	.030	.020	.362**	-.281**	.296**	.300**	-.045	.167**	.473**	.424**	—			
iPA (12)	.085	.113*	.227**	-.108*	.249**	.237**	.099*	.211**	.337**	.349**	.414**	—		
pLK (13)	.040	.097*	.121**	.064	.114*	.109*	.214**	.135**	.166**	.201**	.332**	.547**	—	
rLK (14)	.098*	.078	.195**	-.028	.186**	.191**	.183**	.182**	.236**	.250**	.340**	.554**	.754**	—

Note. $N = 475$ – 500 . SES = socioeconomic status; MB = migration background; Att = parental attitudes towards reading; iHLE = informal home literacy environment; fHLE = formal home literacy environment; Cogn = cognitive skills; pVocab = productive vocabulary; rVocab = receptive vocabulary; rPA = rhyme phonological awareness; iPA = initial phoneme phonological awareness; pLK = productive letter knowledge; rLK = receptive letter knowledge.

^a boys = 0, girls = 1; ^b z-transformed; ^c family language, only German = 0, a language other than German = 1.

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

supplemental materials). All models showed an acceptable to good model fit. Tests for measurement invariance (see Table S1 in supplemental materials) were also conducted for parental attitudes, and formal and informal HLE in R using the lavaan package (Rosseel, 2012). Following Putnick and Bornstein's (2016) suggestions, we contrasted the configural model (with no equality constraints across groups) with both the metric model (loadings are constrained to equality) and the scalar model (both loadings and intercepts are constrained to equality). To evaluate the differences between the constrained models, the changes of the CFI ≤ -0.01 and RMSEA ≤ 0.015 were considered (Chen, 2007). Here, all measurement models showed at least configural measurement invariance across families with and without migration background. Consequently, the mean level comparison between families should be cautiously interpreted. Regarding multicollinearity, all VIF were smaller than 2, indicating that multicollinearity was not a problem in our analyses (O'Brien, 2007).

Structural equation model

In our SEM (see Fig. 2), we tested the relations between migration background, parental attitudes, formal and informal HLE, and children's emergent literacy skills. Further, we controlled for child sex, age, cognitive skills, and family SES. The goodness-of-fit indices indicate an acceptable model fit ($\chi^2(275) = 633.249$, $p = .000$; RMSEA = .051; CFI = .920; SRMR = .058). Families without migration background had more positive attitudes towards reading than families with migration background ($\beta = .242$, $p < .001$). Moreover, children with migration background lived in a higher quality formal HLE ($\beta = .157$, $p < .01$), in a lower quality informal HLE ($\beta = -.188$, $p < .01$), and also showed lower vocabulary skills ($\beta = -.337$, $p < .001$). However, no significant differences were found in PA ($\beta = -.028$, $p = .610$) and letter knowledge ($\beta = .098$, $p = .071$) between children with and without migration background. Moreover, parents with more positive attitudes towards reading showed a higher quality HLE, especially a higher quality informal HLE ($\beta = .505$, $p < .001$), but also a higher quality formal HLE ($\beta = .211$, $p < .01$). Children who lived in a high quality informal HLE only performed significantly better in their vocabulary skills ($\beta = .473$, $p < .01$), whereas parental teaching within the formal HLE was associated with better letter knowledge skills ($\beta = .222$, $p < .001$), but with slightly less vocabulary knowledge ($\beta = -.095$, $p < .05$).

Moreover, significant indirect effects were found (see Table S2 in the supplemental materials). Families with more positive parental attitudes towards reading provided a higher quality informal HLE to their children, who, in turn, showed better vocabulary ($\beta = .239$, $p = .002$, C.I.

[0.127, 0.467]), and a clear tendency for better PA skills ($\beta = .141$, $p = .053$, C.I. [0.006, 0.365]), but did not know significantly more letters ($\beta = .013$, $p = .860$, C.I. [-0.160, 0.203]). Similarly, families with more positive parental attitudes engaged more strongly with formal HLE teaching activities, which in turn fostered children's letter knowledge ($\beta = .047$, $p = .022$, C.I. [0.016, 0.114]). However, no significant indirect effects of parental attitudes towards reading on vocabulary ($\beta = -.020$, $p = .066$, C.I. [-0.050, -0.003]) and PA ($\beta = .010$, $p = .321$, C.I. [-0.009, 0.042]) were found through mediation by the formal HLE.

Regarding migration background, no significant indirect effects mediated by parental attitudes were found for vocabulary ($\beta = -.015$, $p = .501$, C.I. [-0.121, 0.056]), PA ($\beta = -.021$, $p = .378$, C.I. [-0.139, 0.053]), and letter knowledge ($\beta = -.028$, $p = .284$, C.I. [-0.162, 0.045]). Although children with migration background knew significantly fewer words, which was mediated by a less enriched informal HLE ($\beta = -.089$, $p < .01$, C.I. [-0.306, -0.071]), no significant indirect effects were found for PA ($\beta = -.052$, $p = .103$, C.I. [-0.278, -0.006]) and letter knowledge ($\beta = -.005$, $p = .857$, C.I. [-0.133, 0.095]). In addition, children with migration background showed better letter knowledge via richer formal HLE ($\beta = .035$, $p < .009$, C.I. [0.024, 0.131]), but no significant indirect effects of migration background were found on vocabulary mediated by formal HLE ($\beta = -.015$, $p = .055$, C.I. [-0.062, -0.004]) and PA ($\beta = .008$, $p = .295$, C.I. [-0.009, 0.051]).

To identify potential biases in our operationalization of migration background, we used an alternative approach based on the country of origin (e.g., PISA). Children were classified as having a migration background (1) if they or at least one of their parents were not born in Germany; otherwise, they were classified as not having a migration background (0). This resulted in 43 % of families in our sample being classified as having a migration background. When using the language spoken at home as proxy for migration background, the percentage was 38 %. The correlation between both measures was $r = .81$ ($p = .01$) and their relation with other study variables (see Table S3) as well as the SEM results (see Fig. S3), were very similar.

Discussion

A growing body of research in different countries (see Cheung et al., 2021; Park, 2008) demonstrate that parental attitudes towards reading and HLE are important predictors of children's language development (Inoue et al., 2020; Niklas et al., 2020; Sénéchal et al., 1998). However, to the best of our knowledge, no studies have investigated the simultaneous impact of these two constructs on children's literacy skills in the instruction language comparing children with and without migration

background. This study contributes to a better understanding of the social family context of German literacy development for children with and without migration background, and has also implications for an international readership by providing important information about the association of parental attitudes with the HLE and child outcomes.

Association of migration background with processual factors and children's German emergent literacy skills

Our results indicate that parents with migration background tend to express less positive attitudes towards reading (H1a) and provided a lower quality informal HLE, but a higher quality formal HLE (H1b). Aligning with other studies (e.g., Niklas et al., 2020; Novita & Kluczniok, 2022) these findings suggest that fostering positive parental attitudes towards reading could be a key avenue for strengthening the HLE. This finding also might reflect differences in reading traditions and literacy practices as well as varying resources across families from different backgrounds. Encouraging family reading culture and providing diverse reading materials among preschool families could help bridge gaps in young children's German emergent literacy skills. Additionally, culturally responsive literacy initiatives that recognize and integrate different storytelling traditions may further enhance engagement for families with a migration background.

An explanation for the discrepancies in the HLE between both groups might be differences in access to resources (e.g., number of books) or variations in parental knowledge about informal activities such as shared reading (Inoue et al., 2020). Considering the capital theory by Bourdieu (1983), resources accumulate over time. Families who have lived in Germany for generations may have had more opportunities to accumulate economic, social, and cultural resources and pass them on to their children. Indeed, in Germany, children with migration background are often less exposed to informal HLE practices, and rather more intensely exposed to formal HLE practices (Novita & Kluczniok, 2022).

Interestingly, while children without a migration background in our sample were read to earlier, more frequently, and had greater access to books than their peers with migration background, overall shared reading frequency did not differ significantly between the two groups.

An explanation for the strong formal HLE in families with migration background could be that in some countries, formal literacy teaching begins earlier than in Germany. As a result, parents may extend this practice to home interactions, even in German (Novita & Kluczniok, 2022). This aligns with our findings that families with migration background engage more frequently in activities like learning the alphabet, singing songs, or reciting rhymes. Cultural traditions may also contribute to the higher engagement in memorizing songs and rhymes. Future research should explore the language used in both formal and informal literacy activities, employing a mixed-methods approach that includes parental interviews and surveys. This would help capture a broader range of literacy practices that may not have been included in our questionnaire, reducing the risk of bias in this field of research and fostering the development of culturally sensitive measuring instruments, not only for the formal and informal HLE practices, but also for parental attitudes towards reading.

Moreover, children with migration background had lower German vocabulary skills compared to their peers after considering parental attitudes and the HLE (H1c). This may be attributed to differences in informal German literacy exposure, which is essential for vocabulary development (Novita & Kluczniok, 2022). Furthermore, bilingual children have to master two languages at the same time (Butler & Hakuta, 2008), which can influence their vocabulary acquisition (Eisenwort et al., 2018). Also, parents with migration background might have a smaller vocabulary in German, potentially affecting their ability to fully support their children's vocabulary development in this language. Future research could assess parents' linguistic competencies in both majority and minority language to examine their role in children's vocabulary in both languages. Additionally, state institutions could offer

joint language courses for parents and children to promote the skills of both, as well as parental training. For example, non-intensive interventions tend not only to foster the quality of the HLE, but also children's literacy development in the instruction language (Niklas & Schneider, 2015, 2017b). Also, interviews with parents and children would be helpful to assess parental needs, challenges, and goals that may influence the quality of the HLE, especially for families with migration background.

Despite differences in vocabulary, our model suggests that, at least in the last preschool year, children with and without migration background did not differ in their PA and letter knowledge (H1c). A possible explanation for this might be that children with migration background are more strongly exposed to parental alphabet teaching, which fosters code-related skills (Sénéchal & LeFevre, 2002), or also the effects of training measures in formal early childhood education and care centers that are attended by almost all children in the years before school entry (Niklas, Tayler, & Cohrsen, 2018).

Additionally, all these relations were still significant after considering the country of birth as a proxy for migration background instead of the spoken language at home. Our results are consistent with the results from Dubowy et al. (2011), which showed that, when determining migration status based on the mother tongue and parents' country of birth, more children are identified as having a migration background than when classified based on the languages spoken in the family. Their analyses of the relationship between these different operationalizations of migration background and children's German language proficiency show that all examined criteria are capable of identifying children at an increased risk of linguistic deficits. Consequently, this study provides robust results for the relations between migration background and child and family characteristics, independent of the use of home language or country of origin as proxies for migration background.

Relations of parental attitudes towards reading and the home literacy environment

Similar to Weigel et al. (2006) and Bingham (2007), our results show that parents who had more positive attitudes towards reading provided a higher quality formal and informal HLE (H2). However, the wording of the items used in our study to assess parental attitudes focused primarily on shared reading experiences, which is a key component of the informal HLE (Burgess et al., 2002; Niklas, 2015; Sénéchal et al., 1998). Therefore, future research should consider parental attitudes towards literacy teaching to genuinely assess its associations with the formal HLE. Nevertheless, our results indicate that parental attitudes may have an impact on parental teaching behaviors, the number of books they have at home, the frequency of reading, and the literacy interactions with their children.

Formal and informal home literacy environment and children's German emergent literacy skills

Our results show that living in a high quality formal and informal HLE fosters German emergent literacy skills (H3a), especially letter knowledge and vocabulary skills. On the one hand, children whose parents provided a higher quality informal HLE showed significantly better German vocabulary, and a tendentially better PA, but did not know significantly more letters (H3b). On the other hand, parental teaching practices were negatively associated with vocabulary, but positively associated with letter knowledge (H3b). An explanation for this result might be that the formal HLE competes with the informal HLE. Here, the more time parents spend teaching their children the alphabet, the less time may be available for shared reading and vice versa. Further, formal and informal HLE were also not significantly correlated with each other, as some studies show (see Sénéchal et al., 1998), and thus may have an independent influence on child outcomes. Future studies therefore ought to investigate these two domains distinctively.

Our findings, in line with other studies, show that code-related activities such as parental teaching of letter names, name writing, rhymes, and reading fostered letter knowledge (Inoue et al., 2020), whereas informal meaning-related activities such as shared reading fostered vocabulary knowledge (Sénéchal & LeFevre, 2002).

The home literacy environment as mediator between parental attitudes and children's German emergent literacy skills

In addition, the correlation analyses showed that parental attitudes were positively associated with children's German emergent literacy skills. However, the relations between parental attitudes towards reading and children's vocabulary and partly children's PA were mediated by the informal HLE, whereas the association of parental attitudes and letter knowledge was only mediated by the formal HLE (H4). These results are similar to the findings from Niklas et al. (2020) with a younger sample, who found that parental attitudes towards reading fostered the informal HLE, which in turn promoted children's language production and comprehension. Our findings emphasize the importance of the HLE in children's literacy development, as the direct effect of parental attitudes on German emergent literacy abilities was non-significant after considering families' formal and informal HLE.

Parental attitudes and the home literacy environment as mediators between children's migration background and German emergent literacy skills

We also tested whether the negative association between migration background and German emergent literacy skills was mediated by parental attitudes while also controlling for the HLE (H5), and found no significant indirect effects. These results are in accordance with the findings from Niklas et al. (2020), which suggest that the HLE is of greater relevance than parental attitudes, as it acts as a full mediator for the relation between parental attitudes and emergent literacy skills. Similarly, some findings show that the informal HLE and parental attitudes fully mediated the associations between migration background and German emergent literacy skills when these variables were considered separately (Valcárcel Jiménez et al., 2024).

In our study, on the one hand, children with migration background lived – on average – in a more structured formal HLE, which was positively associated with their letter knowledge skills. On the other hand, these children tended to experience informal HLE practices that were, on average, less closely aligned with European mainstream literacy norms, and this was associated with lower vocabulary skills at the end of pre-school. These findings suggest that fostering the informal HLE of families with migration background might be a good target for interventions to face language disparities in vocabulary between children with and without migration background.

Limitations

This study has several limitations. Despite our longitudinal approach, no causal interpretation is possible as additional variables may influence the associations found in our model which were not controlled for such as specific cultural differences in parental attitudes towards reading and the HLE. Additionally, the context of the study must be considered, as parent-child-interactions generally increased during the Covid-19 pandemic (Vaterlaus et al., 2021), implying changes in the quality and quantity of the HLE which may not be stable over time (i.e., a stronger focus on parental teaching due to the fact that day care centers were closed for months during the Covid-19 pandemic).

Moreover, specific cultural differences in parental attitudes or in the HLE quality could not be analyzed due to the cultural heterogeneity in our sample. Due to the resulting small sample size when considering all different languages in the sample separately, families could not be clustered by cultural similarities. Further, the parental survey lacked

detailed information on the language of the books available at home and the specific language used during shared-reading interactions. To accurately measure the parental attitudes and the HLE across families from diverse cultural backgrounds, new assessment tools need to be developed. Conducting parental interviews or observations to evaluate both formal and informal HLE in families with migration backgrounds would offer valuable insights for refining item formulation. Additionally, interviews would help to identify and highlight HLE practices that may be less common in WEIRD (Western, Educated, Industrialized, Rich, and Democratic) societies, but more common in other countries and societies (for a similar discussion on measurement of the home mathematics environment, please refer to Hornburg et al., 2021).

Consequently, our parental questionnaire might not have included or reflected common practices of family from diverse background and thus our results should be interpreted cautiously. Future research should consider how families with a migration background may provide other forms of cultural capital that support children's literacy development. Additionally, the needs for culturally sensitive approaches to assess the HLE and highlight the challenges of comparing these environments across countries are obvious (Susperreguy et al., 2022).

In addition, a more detailed parental survey with open-ended questions could capture the precise practices of families with and without migration background, especially after considering our self-reported parental information via parental survey, which might be biased due to social desirability or retrospective answers. Consequently, a combined assessment with observations of parent-child interactions, qualitative data, and the use of book checklists might also improve the reliability of the HLE measure (e.g., Niklas et al., 2020; Wirth et al., 2022), and grant more insights into the differences in parental attitudes and the formal and informal HLE practices across families from diverse cultural backgrounds.

Additionally, children were simply grouped as having a migration background if the family language was other than German. While our sample encompassed a heterogeneous variety of migration backgrounds (a total of 43 different languages were spoken by our sample), the presence of diverse cultural backgrounds might result in varying outcomes. Future research with a stronger sociological perspective (e.g., Super & Harkness, 2002) could offer insights into how different cultural backgrounds influence parental attitudes and the HLE as well as investigate how mediation effects of HLE on emergent literacy skills vary by children's migration background.

Moreover, it is also important to consider that we only assessed children's literacy skills in German. Consequently, the associations investigated in our study might change when considering the first language of children with migration background. Given the diversity of our sample, it would not have been possible to conduct standardized literacy assessments in all languages. Furthermore, since these children will be entering the German school system, a monolingual school system, literacy skills in German are particularly relevant for their academic success.

Future research on bilingualism should consider first and second language acquisition in relation to parental attitudes, the HLE, and family background characteristics. This is particularly important given that research on bilingualism highlights the potential linguistic and cognitive advantages of children who grow up with two or more languages (e.g., Maluch & Kempert, 2019).

Additionally, we acknowledge that we assessed the quantity of informal HLE practices but did not directly measure the quality of these practices. Our measure of the informal HLE is strongly based on the frequency of shared reading and reading in the family. To easily interpret our results, we kept the terminology used by Sénéchal and LeFevre (2002) and other authors (e.g., Niklas, 2015); however, we also encourage future research to explore how both quantity and quality of the HLE interact and contribute to literacy outcomes, for example by incorporating observations of parent-child-interactions during shared-reading activities, and to include more items that encompass other

informal HLE practices.

Conclusions

The results underpin the importance of parental attitudes towards reading and both formal and informal HLE in explaining differences in children's German emergent literacy skills for children with and without migration background. Beyond the theoretical implications – such as refining the operationalization of the HLE and extending Sénéchal et al.'s (1998) model to consider children's migration background in the German context – this study also has practical significance. First, developing educational programs or interventions to enhance parental attitudes towards reading for all families, but especially for families with low SES or migration background, could foster their HLE, and consequently, children's German literacy development. Parent evenings aimed at providing guidance and raising awareness about the benefits of positive parental attitudes and a high quality HLE could improve learning opportunities at home and enrich parent-child interactions, as these aspects are easier to change than family SES or their migration background.

This empirical evidence underscores that, from an educational science perspective, migration background and SES should be considered necessary covariates rather than supposedly causal explanatory variables. Also, educational programs and interventions could exert a long-term impact on literacy development of toddlers (Attig & Weinert, 2020; Linberg et al., 2020), preschoolers (Cohen et al., 2020; Niklas & Schneider, 2015, 2017b), and also for children in primary school (Sénéchal & Young, 2008). By supporting proficiency in the language of instruction, such interventions could help reduce achievement gaps and social disparities.

CRediT authorship contribution statement

María Valcárcel Jiménez: Writing – review & editing, Writing – original draft, Investigation, Formal analysis. **Jörg-Henrik Heine:** Writing – review & editing, Methodology. **Tina Schiele:** Writing – review & editing. **Anna Mues:** Writing – review & editing. **Frank Niklas:** Writing – review & editing, Project administration, Investigation, Funding acquisition, Conceptualization.

Consent to participate

Formal consent to participate was obtained by all participating families.

Consent for publication

All authors consent to the publication of the manuscript in *Journal of Applied Developmental Psychology*. Formal consent to publish anonymized data was obtained by all participating families.

Ethics approval

This study was ethically approved by the European Research Council Executive Agency. This study was performed in line with the principles of the Declaration of Helsinki. Approval was granted by the ethics committee of the Faculty of Psychology and Educational Sciences, University of Munich (LMU).

Statements and declarations

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Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.appdev.2025.101830>.

Data availability

All data and material are available from FN, upon reasonable request.

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