Disentangling the Impact of Bilingualism and SES in Literacy Skills of Language-Minority Bilingual Children and Monolingual Peers Exposed to French

Short title: SES and Bilingualism in LMBC literacy

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Statements related to ethics and integrity policies

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The authors declare that they have no known competing financial interests or relationships that could have appeared to influence the work reported in this paper.

Ethics approval

The entire study was conducted according to the guidelines of the Declaration of Helsinki (2008) and it was approved by the Institutional Review Board of the Local Education Authority of the Montpellier Academy (France) (31 January 2019). Parents gave written and informed consent for their child's participation.

Permission to reproduce material from other sources

Not applicable.

Data sharing, data availability statements, and data citation

Data availability

The data that support the findings of this study are available from the corresponding author upon reasonable request.

Data citation

Not applicable.

Data sharing

Not applicable.

Abstract

In the present study we aimed to disentangle the impact of bilingualism and socioeconomic status (SES) on literacy in language-minority bilingual children (LMBC) and monolinguals exposed to French. We also wanted to explore the role of these two factors on cognitive and language skills, i.e., verbal knowledge (VK), morphosyntactic comprehension (MC), and phonological short-term memory (PSTM), well known to be important predictors of literacy acquisition. We compared LMBC with low and medium-high SES, and monolinguals with low and medium-high SES. All the children attended Grades 3, 4, and 5. We found that LMBC underperformed monolinguals on VK and MC. Low SES children showed lower scores compared to medium-high SES children on VK, MC, and PSTM. With regard to literacy, LMBC underperformed monolinguals on text and irregular word reading. Low SES children underperformed medium-high SES children only in regular word reading and pseudoword spelling. As a whole, bilingualism had an effect on measures involving lexical components, while SES had a more widespread effect on cognitive and language skills. The results are discussed considering implications for research, clinical, and educational settings.

Keywords: bilingualism; language-minority bilingual children; SES; reading; spelling

Introduction

In many Western countries, due to the intensification of migration processes, the number of children exposed to a learning system in a language different from their L1 is increasing. In 2021, according to the French National Institute of Statistics and Economic Studies (INSEE, 2021a), France had 7 million immigrants, about 10% of its total population. In this context, a growing number of children are exposed from birth to one (or more) language(s) different from that of schooling. This language is often referred to as a "minority" language because it is different from the official (or "majority") language of the country of residence and spoken only by a minor part of the population. Thus, we refer to these children as Language-Minority Bilingual Children (LMBC, here and after). According to Grosjean (1989), bilinguals can be broadly defined as people who "use two or more languages in their daily lives" (p. 4). Thus, for this research, we considered children who speak or are regularly exposed to at least two languages, including one or more minority languages, as bilinguals.

Even though these children are exposed to the majority language of the country of residence at a relatively early age, they may begin school with less proficiency in the language of schooling (often indicated as a second language – l2) than their monolingual peers and may face more challenges in academic learning due to a lack of exposure and the different time spans needed to develop specific academic skills. In particular, difficulties may emerge in reading, either in decoding or passage comprehension (e.g., August & Shanahan, 2006; Bellocchi et al., 2017; Kovelman et al., 2008; Melby-Lervåg, & Lervåg, 2014).

However, the gaps observed in LMBC do not necessarily mean learning disorders, as they might be explained with reference to several issues that need to be considered in this population. First, according to the distinction proposed by Cummins (2008), some literacy skills might fall within the so-called CALP (Cognitive Academic Language Proficiency) skills, which might require up to 5–7 years of schooling before reaching a performance level

similar to monolingual peers (Hakuta et al., 2000). Conversely, BICS (Basic Interpersonal Communication Skills) might be acquired within 1–3 years of constant exposure to develop fully. Thus, a child proficient in daily conversation in L2 might still underachieve in academic tasks such as reading comprehension and writing skills. Also, disadvantages often attributed to bilingualism might not reflect an effect of bilingualism *per se* but rather the result of environmental factors (Paradis et al., 2021; Saenz & Huer, 2003). For example, it is well known that socioeconomic status (SES) might affect cognitive, language, and literacy development (e.g., Calvo & Bialystok, 2014; Hassunah-Arafat et al., 2021; Hoff, 2003; 2006) and that SES disadvantage may put children at risk for low achievement (e.g., Kieffer, 2010). What is the link between SES and bilingualism? Often, migrant families who speak a minority language at home and whose children are LMBC have a low SES. In France, it is estimated that the median income for migrant families is about 25% lower compared to non-migrant families (INSEE, 2021b). Thus, if SES and bilingualism are known to be factors potentially affecting literacy development, there is a need to disentangle the relationship between bilingualism and SES.

The present study focused on LMB children while trying to disentangle the role of bilingualism and SES on literacy achievement. Furthermore, even if many studies have explored how LMBC read and comprehend, how they learn to spell has received less attention (see Affranti et al., 2022). In this study, we thus explored both LMBC's reading and spelling abilities. Also, to the best of our knowledge, very few studies investigated literacy development in LMBC learning in French (see Bellocchi & Gogic, 2022), a language characterized by an intermediate complexity orthography (Seymour et al., 2003).

Reading and spelling in bilingual and language-minority bilingual children

August and Shanahan's (2006) seminal review shows that after only 1 to 2 years of schooling in their L2, most of them achieve quite adequate performance in decoding English-L2 words and pseudowords and close to that of their monolingual peers. This result has been replicated by studies focusing on transparent orthographies such as Dutch (e.g., Droop & Verhoeven, 2003) and Italian (Bellocchi et al., 2016; Bellocchi et al., 2017; Bonifacci & Tobia, 2017). However, bilingual children may underperform in words with increased orthographic complexity (Droop & Verhoeven, 2003) or specific conditions (Bellocchi et al., 2016) compared to monolinguals. In particular, Bellocchi and colleagues (2016) found that late bilinguals exposed to Italian as L2 were less accurate than early bilinguals and monolinguals in assigning non-dominant stress to low-frequency words. Additionally, it is important to point out here that one of the most consistent results in the literature is that of similar pseudoword decoding skills in bilinguals and monolinguals (e.g., August & Shanahan, 2006; Bellocchi et al., 2017; Bonifacci & Tobia, 2017; Droop & Verhoeven, 2003; Lesaux, & Siegel, 2003; Melby-Lervåg & Lervåg, 2014), suggesting that bilingual children usually display good skills in using the sublexical route for reading. This result seems to be replicated across L2-orthographies with varying levels of orthographic complexity, going from the opaquest English to the more transparent ones, like Dutch or Italian. It remains to be seen if these results are replicated in French, characterized by an intermediate complexity orthography (Seymour et al., 2003).

Concerning spelling, two studies on bilingual children exposed to Dutch as L2 reported that they underperformed compared to monolinguals in word spelling (Verhoeven, 2000), at least until the end of primary school (Verpalen et al., 2018). Similarly, LMBC students exposed to German were more likely to be classified as poor spellers in 3rd-4th grade than in higher grades (Zhang et al., 2021). A study involving LMBC learning Italian as L2 found that 4th-5th grader LMBC underperformed in spelling tasks compared to their

monolingual peers: almost 50% of the bilingual sample had a below-average performance in word spelling and 30% in nonword spelling (Bonifacci et al., 2017). Interestingly, these differences did not persist when comparing results in spelling tasks in English, for which groups shared the same starting point and exposure. Similar results were found in Bonifacci et al. (2020; 2022), where LMBC students from 2nd to 5th grade underperformed compared to monolinguals in a dictation task, even when controlling for socioeconomic status. More recently, Affranti et al. (2022) showed that LMBC did not reach a monolingual-like proficiency in word and pseudoword spelling by the end of primary school, while they were similar to monolinguals in reading tasks and were able to produce written narratives with adequate macrostructure, syntactic complexity, and lexical variety.

Effects of socio-economic status and bilingualism in reading and spelling

As mentioned above, it is well known that SES might affect cognitive, language, and literacy development (e.g., see also the meta-analytic study by Monnier et al. (2022) on the importance of SES on bilingual cognitive advantage) and that SES disadvantage may put children at risk for low achievement.

Studies by Bialystok and colleagues showed independent effects of bilingualism and SES on language and cognitive development (Calvo & Bialystok, 2014). All children with high SES showed better performance, independent of their language profile. Also, bilinguals had lower vocabulary scores but better performances in executive function tasks independent of their SES. In other words, whereas SES was shown to affect both language and cognitive skills, bilingualism was only associated with lower performance on language tasks. Still, it showed an advantage on executive function tasks. Moreover, Hoff (2013) showed that children from low-SES and language minorities despite having linguistic strengths, reach school age with lower levels of English language skills than do middle-class, monolingual

children, putting LMBC in difficulty for academic achievement. Additionally, Meir and Armon-Lotem (2017) demonstrated that bilingualism was associated mainly with decreased performance in linguistic measures (i.e., vocabulary size and verbal short-term memory tasks, with higher linguistic load in L2). In contrast, SES also affected verbal short-term memory performance, with a low linguistic load.

Concerning literacy acquisition, it is well known that SES affects literacy. Kieffer (2010) found that English- language learners and students from low socioeconomic backgrounds are at significantly elevated risk for late-emerging difficulties. Also, bilinguals and monolinguals from similar socioeconomic backgrounds are at similar risk. In addition, Hassunah-Arafat et al. (2021) highlighted that family SES significantly explained preschoolers' early literacy skills. However, SES was not the lonely factor since the richness of the Home Literacy Environment (HLE) also contributed to literacy skills. Nevertheless, only a paucity of studies has focused on disentangling the role of SES and bilingualism in literacy acquisition. Some studies conducted in Italy (Bonifacci et al., 2020; 2022) suggested that SES rather than bilingualism was the discriminating factor of reading comprehension skills at the end of primary school. On the counterpart, bilingualism, but not SES, was the critical factor of spelling disadvantage over the primary school years.

The present study

In the present study, we aimed to disentangle the impact of bilingualism and SES in LMBC learning to read and spell in French and attending the three final years of primary school. We also wanted to explore the role of these two variables on cognitive and linguistic skills, i.e., verbal knowledge, morphosyntactic comprehension, and phonological short-term memory, well known to be significant predictors of literacy acquisition, also in French (e.g., Kirby et al., 2008).

In particular, we compared bilinguals and monolinguals with low to medium to high-SES. This can provide information about possible independent and/or interactive effects of SES and bilingualism on literacy acquisition.

In particular, according to the current state of the art, some specific predictions could be proposed:

1. *Nonverbal intellectual functioning and oral language.* According to previous studies, we hypothesized that both bilingualism and SES could play a role here. In particular, according to previous findings (e.g., Calvo & Bialystok, 2014; Meir & Armon-Lotem, 2017), we predicted an effect of bilingualism on verbal knowledge and morphosyntactic comprehension, i.e., LMBC underperforming monolinguals. Also, an effect of SES could be expected, following the same trend. No effects of bilingualism are expected concerning nonverbal intellectual functioning and phonological short-term memory, whereas SES might negatively affect these skills.
2. *Reading.* Considering previous research, we did not expect an effect of bilingualism on word and pseudoword reading (e.g., August and Shanahan, 2006). However, according to Bellocchi et al. (2016), we hypothesized that LMBC could underperform monolinguals on irregular word reading. With regard to SES, no effects are expected here, according to Bonifacci et al. (2020; 2022).
3. *Spelling.* Considering previous results on transparent orthographies (i.e., Italian and Dutch; e.g., Bonifacci et al., 2020; Verpalen et al., 2018), we could expect in French, an intermediate complexity orthography, an independent effect of bilingualism on spelling, i.e., LMBC underperforming monolinguals. Considering SES, again, no effects are expected on spelling, according to Bonifacci et al. (2020; 2022).

Method

Participants

The total sample consisted of one hundred and fourteen children (49.1% boys, mean age = 116.55 months, *SD* = 12.14) attending Grades 3, 4, and 5 (Grade 3: 33.3%; Grade 4: 24.6%; Grade 5: 42.1%). They were recruited from six classes of two primary schools in southern France. We excluded children with sensory or neurological impairments and children diagnosed with neurodevelopmental disorders. They all had average intellectual functioning levels (i.e., nonverbal IQ at least above 80). The sample consisted of sixty-seven monolinguals (47,8% boys, mean age = 117.49 months, *SD* = 11.69) and forty-seven LMBC (51.1% boys, mean age in months = 115.21; *SD* = 12.75). We only included bilingual children with at least two years of continuous exposure to French in the school setting whose parents both speak a minority language at home. In addition, the average age of first exposure to French was 12.82 months (*SD* = 21.09 months), thus indicating an early exposure to French. Furthermore, across all grade levels, parents' ratings of children's language proficiency in their L1 indicated a good level of oral comprehension and production (respectively, *M* = 5.38; *SD* = 2.83; *M* = 5.23; *SD* = 1.70; on a Likert scale of 1 to 7 where 1= very low proficiency level; 7= very high proficiency level). LMBC were exposed to a great heterogeneity of languages in the family context: Arabic (63.83%), Spanish (10.64%), and other languages (Turkish, Portuguese, Armenian, Italian, Romanian: 25.53%).

All children were divided into two groups according to the combined children's SES scores measured by the Hollingshead Four Factor Index of Social Status (Hollingshead, 1975): one group with low SES (*n* =59; scores between 8 and 29; *M* = 18.98; *SD* = 5.70), and another with medium to high SES (*n* =55; scores ≥ 30; *M* = 46.37; *SD* = 9.92). As a consequence, the difference in the combined children's SES scores between these two groups was statistically significant [t (112) =-18.22; p=<.001].

Materials

Socio-economic level (SES)

The Hollingshead Four Factor Index of Social Status (Hollingshead, 1975) has been adopted. For the present study, educational level (EL) and occupation (O) indexes were used. A score from 1 to 7 was given for educational level and a score between 1 and 9 for occupation. SES scores for fathers and mothers have been calculated with the formula EL*3+O*5, and a compound SES score for children derived from the mean of the two values. Scores between 0 and 29 were classified as low, and scores above 30 as medium to high.

Linguistic history

A questionnaire examining the linguistic history of bilinguals has been included in the study (Bellocchi et al., 2020). It is a questionnaire for parents to collect information on children's linguistic history, and it has been used to accomplish inclusion and exclusion criteria. Data from the questionnaire were selected, and the following were considered for the present study: age of first exposure to French, parents' and teachers' perceived proficiency in L1 and L2, and presence or absence of schooling in the children's minority language.

Nonverbal intellectual functioning

Nonverbal cognitive abilities were assessed with the matrix subtest from the Kaufman Brief Intelligence Test-2, K-BIT2 (Kaufman & Kaufman, 2004). The child was asked to choose a picture, among six proposals, that best corresponds to the matrix presented. A total of 46 matrices composed the test. One point was awarded for each correct answer for a score ranging from 0 to 46.

Oral language

Verbal knowledge. We adapted, in French, for the purpose of the present study, the subtest of verbal knowledge from the Kaufman Brief Intelligence Test-2 (K-BIT2; Kaufman & Kaufman, 2004). In this task, the experimenter pronounces a word or a short sentence aloud, and the child is asked to choose one picture among a group of six that best depicts it. The test comprised 60 items; one point was awarded for each correct answer for a score ranging from 0 to 60.

Morphosyntactic comprehension. We used the subtest of the ECOSSE presented in the "BALE" battery (Jacquier-Roux et al., 2010). The child was asked to listen to a sentence read by the examiner, then presented with a board of four pictures and asked to point to the picture that best corresponds to the sentence (e.g., "the apple the boy is eating is black"). The sentence was spoken only once. In total, 20 sentences were presented to the child. One point was awarded for each correct answer for a score ranging from 0 to 20.

Phonological short-term memory. In order to test this skill, participants performed a pseudoword repetition task included in the "BALE" battery (Jacquier-Roux et al., 2010). Children were instructed to listen to 20 meaningless words spoken by the examiner and to repeat them exactly as they had heard, without modifying them in any way (e.g., "gontra"). The pseudowords were repeated one by one. The examiner recorded the number of correct responses (accuracy) for each child. The maximum score is 20.

Reading

Text passage. We used the 'Alouette Test-R' (Lefavrais, 2005), which is commonly used in France to assess reading proficiency. Participants are instructed to read the 265-word text passage as fast and accurately as possible, within 3 minutes. The test provides two z-scores, one based on fluency (number of words correctly read in 3 min) and the second on accuracy (reading errors being considered).

Irregular, regular words and pseudowords. We used the subtest of word reading of the ODEDYS-2 test (Jacquier-Roux et al., 2005). Sixty words were presented in three lists of 20 words each: a list of irregular words (e.g., “galop” [gallop]), a list of regular words (e.g., “dorade” [sea bream]), and a list of pseudowords (e.g., “gavin”). The child was asked to read the words as quickly and correctly as possible. Reading speed was recorded in seconds, and 1 point was awarded per correctly read word for a score ranging from 0 to 20 for each category (regular words, irregular words, pseudowords).

Spelling

Spelling was tested by dictating three lists of items taken from the ODEDYS-2 test (Jacquier-Roux et al., 2005). In total, 30 words were presented in three lists of 10 words each: a list of irregular words (e.g., “femme” [woman]), a list of regular words (e.g., “poisson” [fish]), and a list of pseudowords (e.g., “datoir”). The child was asked to write the words as correctly as possible. One point was awarded per each correctly written word for a score ranging from 0 to 10 for each category (regular words, irregular words, pseudowords).

Procedure

Children were tested individually in a quiet room in their school. Testing took approximately 40 minutes per child. The order of tasks was counterbalanced across the sample. In addition, parents were asked to complete the questionnaire at home in a quiet setting (Bellocchi et al., 2020). The study was conducted according to the guidelines of the Declaration of Helsinki (2008) and approved by the Institutional Review Board of the Local Education Authority of the Montpellier Academy (France) (31 January 2019). Parents gave written consent for their child's participation.

Data analysis

Preliminary analysis on outliers evidenced that only some participants scored over the absolute value of 3 SDs on some tasks. These were less than 5% of the data, and we were allowed to proceed with the Winsorizing method (Duan, 1997; Wilcox, 2010), which suggests modifying outliers at the end of the tails of the distribution to the highest/lowest value within the distribution that are not suspected to be outliers. The data resulted normally distributed, with skewness and kurtosis ranging in the limits of ±2 (acceptable values according to Trochim & Donnelly, 2006). All the values are reported in Table 1.

Univariate analysis of variance was run on standardized scores for each test (standard scores for nonverbal IQ and z scores for oral language, reading, and spelling tasks) using a 2 (bilingualism: LMBC *vs*. monolinguals) x 2 (SES: low *vs*. medium-high) design. All factors were between-participant factors. Effect sizes are reported as partial eta-square (η_{2p}, Bakeman, 2005). Considering the exploratory nature of the analyses, multiple test adjustment was not performed (Bender & Lange, 2001).

Statistical analyses were conducted using IBM SPSS, version 28.

Results

Table 1 reports descriptive statistics for each task according to four groups: low-SES LMBC (Low_LMBC), low-SES monolinguals (Low_M), medium to high-SES LMBC (MHigh_LMBC), and medium to high-SES monolinguals (MHigh_M). In addition, we present significant statistical effects from the 2x2 ANOVAs. Scores are expressed in standard scores (SS) (nonverbal IQ) and z scores (oral language, reading, and spelling tasks). Figures 1, 2, and 3 report all the results from the 2x2 ANOVAs.

[Insert Table 1 about here]

Nonverbal intellectual functioning

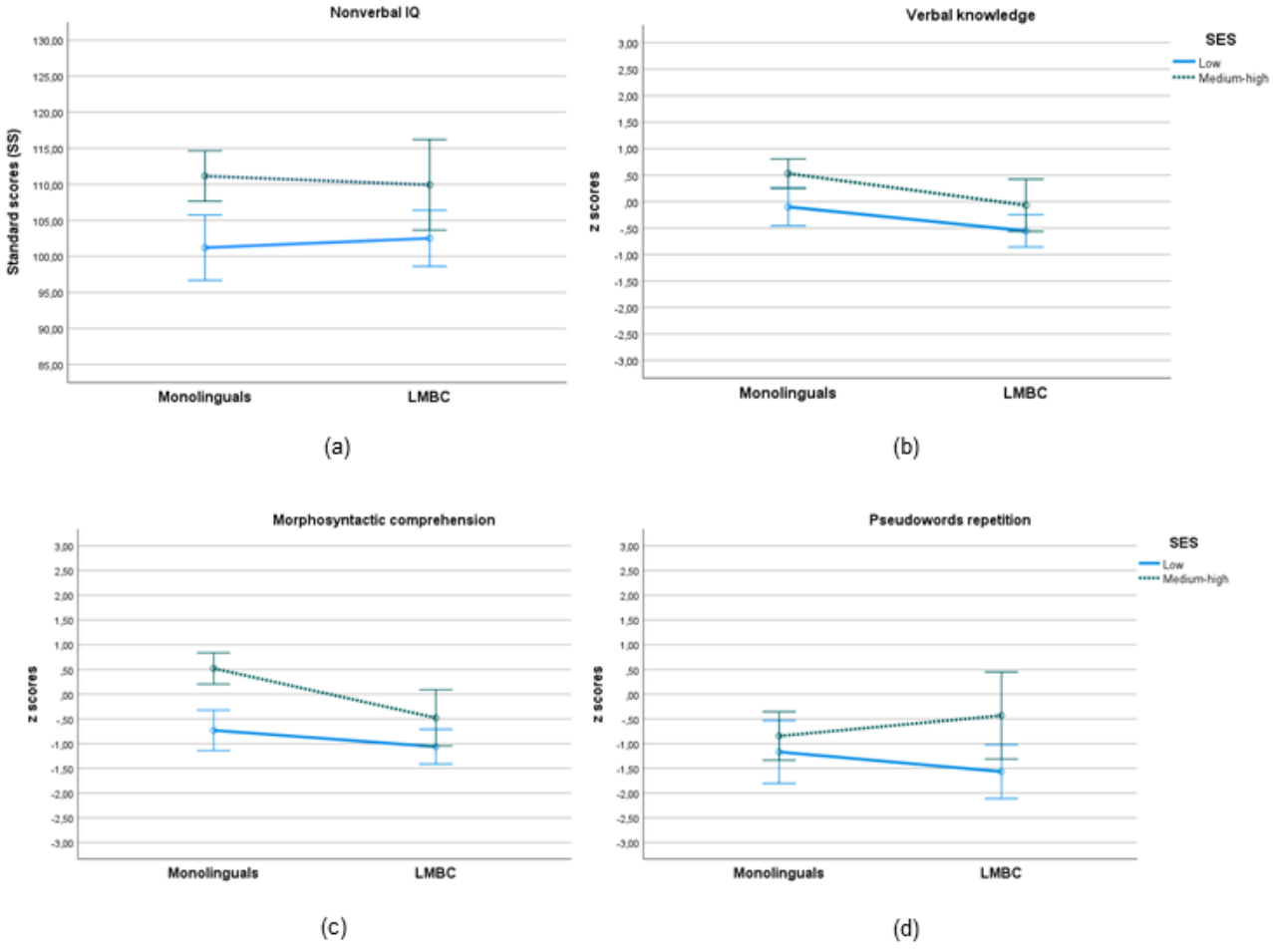
The analysis showed no difference between LMBC and monolinguals on nonverbal IQ (p=n.s.). However, a main effect of SES emerged [F (1,113) = 13.57; p<.001; η_{2p} = .11]: low-SES children showed lower nonverbal IQ compared to medium-high-SES children (standard scores: Low-SES: *M* = 101.95; *SD* = 12.30; MHigh-SES: *M* = 110.85; *SD* = 10.22). Figure 1(a) illustrates these results. Also, no bilingualism x SES interactions emerged (p=n.s.)

Oral language

The ANOVA on verbal knowledge revealed a main effect of bilingualism [F (1,113) = 8.10; p=.005; η_{2p} =.07] and SES [F (1,113) = 9.07; p=.003; η_{2p} = .08], showing that LMBC underperformed monolinguals (z scores: LMBC: *M* = -0.42; *SD* =1.12; monolinguals: *M* = 0.29; *SD* =0.77), and low-SES children underperformed medium-high-SES children (z scores: Low-SES: *M* = -0.36; *SD* = 1.06; MHigh-SES: *M* = 0.39; *SD* =0.75). The same trend was found for morphosyntactic comprehension, with a main effect of bilingualism [F (1,113) = 9.73; p=.002; η_{2p} = .08] and SES [F (1,113) = 18.59; p<.001; η_{2p} = .14], where a univariate test showed that LMBC underperformed monolinguals and low-SES children underperformed medium-high-SES children (respectively: z scores: LMBC: *M* = -0.90; *SD* = 1.19; monolinguals : *M* = 0.05; *SD* = 1.10; Low-SES: *M* = -0.92; *SD* =1.21; MHigh-SES: *M* = 0.28; *SD* =0.90). In contrast, for pseudoword repetition, there was only a main effect of SES [F (1,113) = 4.86; p=.030; η_{2p} = .04], but not of bilingualism (p=n.s.). In particular, low-SES children underperformed medium-high-SES children [z scores: Low-SES: *M* = -1.40; *SD* =1.76; MHigh-SES: *M* = -0.75; *SD* = 1.41]. Finally, no bilingualism x SES interactions emerged on all these variables (p=n.s.). Figure 1(b,c,d) reports all these results.

Fig. 1

Effects of bilingualism (monolinguals vs. LMBC) and SES (low vs. medium-high) on nonverbal intellectual functioning (nonverbal IQ) (a) and oral language (b: verbal knowledge; c: morphosyntactic comprehension; d: phonological short-term memory). Error bars represent CI (95%).



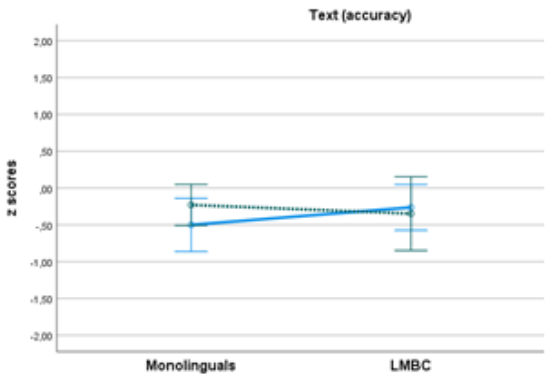
Reading

The statistical analyses revealed a main effect of bilingualism on text reading (speed) [F (1,113) = 9.48; p=.003; η_{2p} = .08] showing that LMBC underperformed monolinguals (z scores: LMBC: *M* = -0.16; *SD* = 0.82; monolinguals: *M* = 0.51; *SD* = 1.24). No main effect of

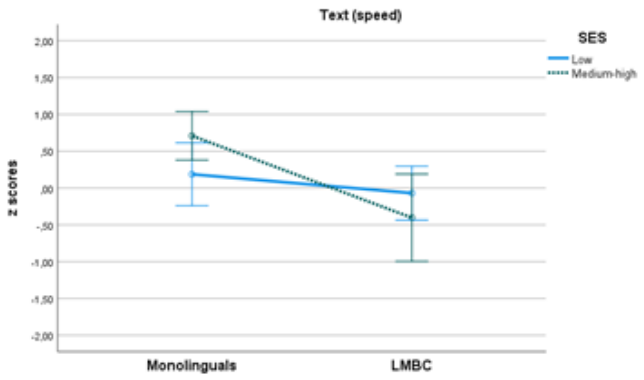
SES was found (p=n.s.). Furthermore, results showed a main effect of bilingualism on irregular words reading (accuracy) [F (1,113) = 4.23; p=.042; η_{2p} = .04] showing that LMBC underperformed monolinguals (z scores: LMBC: *M* = -0.50; *SD* = 1.13; monolinguals: *M* = 0.09; *SD* = 1.08). Additionally, our results showed a main effect of SES on regular words reading (accuracy) [F (1,113) = 4.34; p=.040; η_{2p} = .04] where low-SES children underperformed medium-high-SES ones (z scores: Low-SES: *M* = -0.66; *SD* = 0.97; MHigh-SES: *M* = -0.09; *SD* = 0.92), but no main effect of bilingualism (p=n.s.). Also, we did not find any main effects of bilingualism and SES on text reading (accuracy), irregular and regular word reading (speed), and pseudoword decoding (both accuracy and speed). Finally, no bilingualism x SES interactions emerged on all these variables (p=n.s.). All these results are reported in Figure 2 below.

Fig. 2

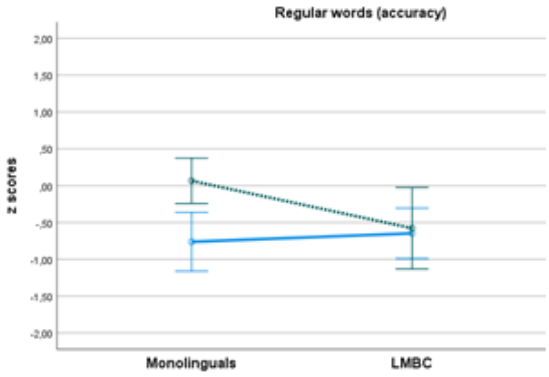
Effects of bilingualism (monolinguals vs. LMBC) and SES (low vs. medium-high) on reading abilities (a-b: text; c-d: regular words; e-f: irregular words; g-h: pseudowords). Error bars represent CI (95%).


Text (accuracy)
z scores
2,00
1,50
1,00
,50
,00
-,50
-1,00
-1,50
-2,00
Monolinguals
LMBC

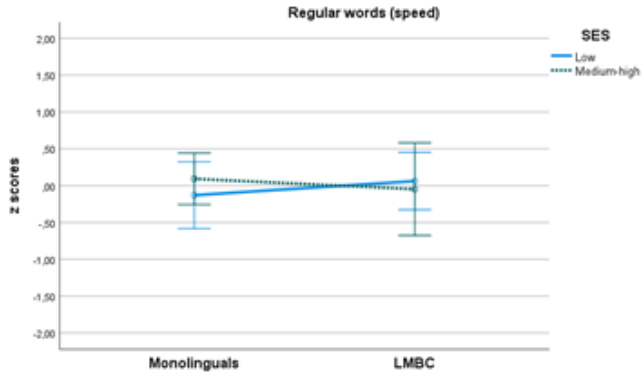
(a)


Text (speed)
z scores
SES
Low
Medium-high
Monolinguals
LMBC

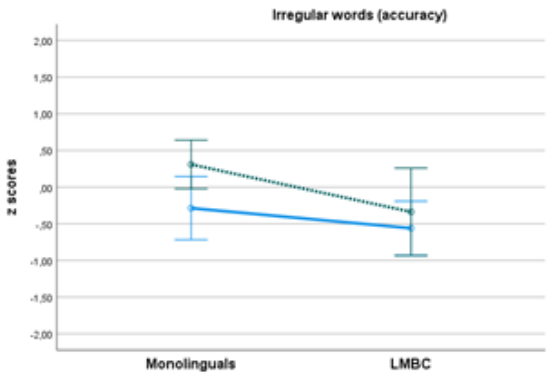
(b)


Regular words (accuracy)
z scores
Monolinguals
LMBC

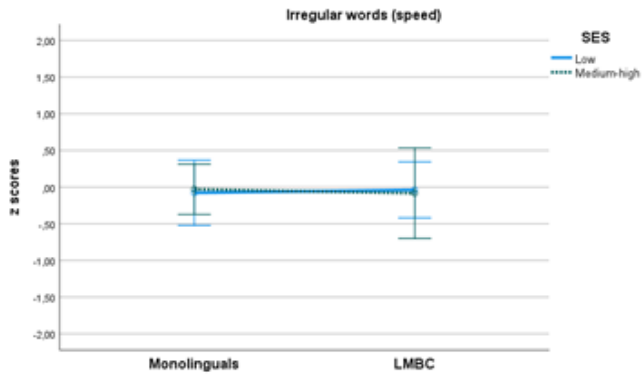
(c)


Regular words (speed)
z scores
SES
Low
Medium-high
Monolinguals
LMBC

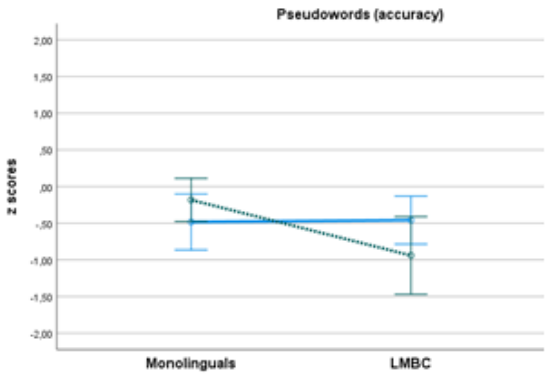
(d)


Irregular words (accuracy)
z scores
Monolinguals
LMBC

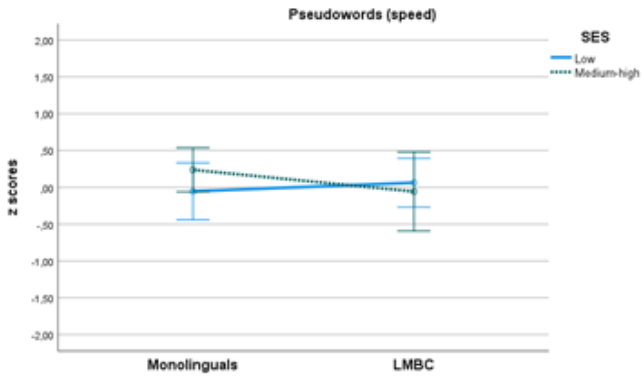
(e)


Irregular words (speed)
z scores
SES
Low
Medium-high
Monolinguals
LMBC

(f)


Pseudowords (accuracy)
z scores
Monolinguals
LMBC

(g)


Pseudowords (speed)
z scores
SES
Low
Medium-high
Monolinguals
LMBC

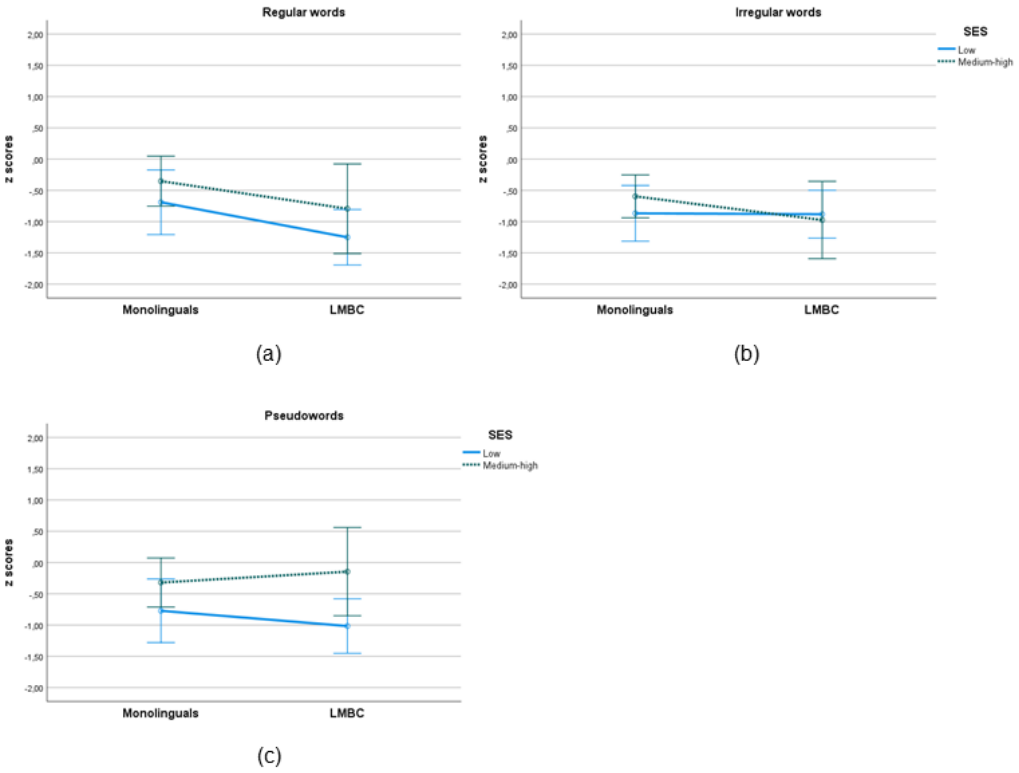
(h)

Spelling

The results revealed only a main effect of SES on pseudoword spelling [F (1,113) = 6.24; p=.014; η_{2p} = .05] where low-SES children underperformed medium-high-SES ones (z scores: Low-SES: *M* = -0.91; *SD* =1.36; MHigh-SES: *M* = -0.28; *SD* = 1.17). There was no effect of bilingualism (p=n.s.). In addition, we did not find any significant effect of bilingualism and SES on regular and irregular word spelling, and no bilingualism x SES interactions emerged on all these variables (all p=n.s.).

Fig. 3

Effects of bilingualism (monolinguals vs. LMBC) and SES (low vs. medium-high) on spelling abilities (a: regular words; b: irregular words; c: pseudowords). Error bars represent CI (95%).



Discussion

The present study aimed to disentangle the effects of bilingualism and SES on cognitive, linguistic, and literacy skills in children attending primary school. More specifically, based on parents' questionnaires, four groups of children were compared: bilinguals with low SES or medium to high SES and monolinguals with low SES or medium to high SES.

Regarding the first research question, i.e., the differential effects of bilingualism and SES on domain-general cognitive and oral language, it was found that SES had an impact on all the considered dimensions, that is, nonverbal IQ, verbal knowledge, morphosyntactic comprehension, and pseudoword repetition, with poorer performances in children from low-SES families. The effect of bilingualism was specific for the tasks that involve a lexical component (i.e., verbal knowledge and morphosyntactic comprehension), with lower scores in the bilingual group.

These results partially confirm previous studies. As in Calvo and Bialystok (2014), SES and bilingualism affected vocabulary. In line with Meir and Armon-Lotem (2017), bilinguals underperformed compared to monolinguals in tasks with a high verbal load but not in phonological memory, as assessed through a pseudoword repetition task. The present study adds an effect of bilingualism on morphosyntactic comprehension, which was not included in previous studies. However, it aligns with the idea of poorer skills in bilinguals on tasks with a high verbal/lexical load. Moreover, we found an effect of SES on nonverbal reasoning. However, contrary to previous studies, we also found that SES impacted phonological memory. Regarding nonverbal IQ, previous studies reported a negative association between SES and nonverbal reasoning, possibly due to the idea that limited access to resources, including nutrition and education, might have adverse effects on mental resources (Mani et al., 2013; Dolean & Cãlugãr, 2020). It is important to underline that all students had a

nonverbal IQ above 80, therefore within the norms. The effect of SES evidenced by the present study is referred to the medium-high levels of nonverbal IQ, suggesting that low-SES children might encounter obstacles that limit the expression of their potential. Contrasting results and limited evidence concerning the relationship between SES and pseudoword repetition are available. Some studies did not find significant relationships (Chiat & Polišenská, 2016; Balladares et al., 2016), but others did (Seeff-Gabriel et al., 2008; Roy & Chiat, 2013). Some of these differences might be explained by considering the properties of the stimuli used. For example, Chiat and Polišenská (2016) adopted nonwords specifically developed for being quasi-universal in terms of phonotactic structures, while we adopted a task developed according to French rules in the present study.

Moving to the second research question, i.e., reading abilities and the differential effect of SES and bilingualism, a main effect of SES was found only in the accuracy of regular words. In contrast, bilingualism affected text reading speed and irregular word reading accuracy. These results are in line with previous evidence of longer text reading times (e.g., Bonifacci & Tobia, 2016) and irregular word reading (Bellocchi et al., 2016) in LMBC, suggesting that bilingualism might affect reading tasks that primarily rely on the lexical route, due to their limited vocabulary (e.g., Bialystok, 2009). However, similar to French monolinguals, LMBC seem to be able to acquire regular word and pseudoword reading abilities at a reasonably fast rate. Indeed, at the end of Grade 1, French monolinguals can read about 87% of words and 80% of pseudowords accurately (Sprenger-Charolles et al., 1998; for a review, see Deacon et al., 2017). Furthermore, the absence of bilingualism effect on pseudoword decoding suggests that LMBC exposed to French displayed good skills in using the sublexical route for reading aloud (e.g., Perry et al., 2007). The effect of SES on regular word reading might suggest that for children with low SES regularity effect (better accuracy for words with regular *vs.* irregular grapheme-phoneme correspondences) usually evident

from Grade 1 (e.g., Sprenger-Charolles & Casalis, 1995), might show a delay, possibly due to less exposure to reading at home. Indeed, many studies have highlighted the close link between Home Literacy Environment (HLE) and children's linguistic and academic performance (e.g., Boonk, et al., 2018). In particular, it has been proposed that HLE mediates the relationships between SES and children's early literacy (Bonifacci et al., 2021). At the same time, in the present study, we found only a single effect of SES on word reading accuracy, suggesting that SES globally did not significantly impact decoding skills, as also documented by Bonifacci et al. (2020; 2022).

Regarding spelling, no main effect of bilingualism was found. This result is in contrast with what emerged in previous studies on transparent languages such as Italian (Bonifacci et al., 2020; 2022; Affranti et al., 2022) and Dutch (Verhoeven, 2000; Verpalen et al., 2018), where bilinguals underperformed compared to monolinguals. However, results from the present study are more in line with other studies conducted on opaque orthographies, particularly English, which reported similar performances in bilinguals and monolinguals in the final years of primary school (Zhao et al., 2016; Lesaux & Siegel, 2003). Since monolingual children exposed to opaque languages commit more spelling errors and need more time to consolidate spelling skills, compared to monolingual children acquiring a transparent language (Treiman & Kessler, 2005; Seymour et al., 2003), the bilingual's gap in writing skills might be more consistent for transparent *vs*. opaque languages. In French monolingual children are almost at ceiling in spelling pseudowords (Alegria & Mousty, 1996) at the end of second grade, but it takes more time to master the spelling of final mute letters (Fayol et al., 2006).

The finding that low SES children underperformed compared to medium-high SES children in pseudoword spelling was somehow unexpected. The available studies on pseudoword spelling tasks did not report an effect of SES (Bonifacci et al., 2020; 2022;

Affranti et al., 2022), however, more evidence needs to be collected on opaques languages. In the present study, SES also affected pseudoword repetition, suggesting that phonological short-term memory might suffer the effects of SES. Although further studies are needed to investigate this issue better, a tentative explanation is that pseudoword repetition (which is also involved in pseudoword spelling) is a highly heritable trait (Bishop et al., 2004) that is part of the working memory system for which previous evidence found an effect of SES (Meir & Armon-Lotem, 2017).

Conclusions

To sum up, the present study adds to previous literature new insights on the differential role of SES and bilingualism on cognitive, linguistic, and literacy skills. Bilingualism was found to only affect linguistic tasks (verbal knowledge and morphosyntactic comprehension), text reading speed, and irregular word reading. On the counterpart, SES affected both linguistic and cognitive skills (nonverbal IQ, phonological short-term memory), regular word reading, and pseudoword spelling, suggesting more widespread effects, also in the so-called 'processing measures' (Thordardottir & Brandeker, 2013) such as pseudoword tasks. Unlike Bonifacci et al. (2020; 2022), who did not include a sample of high SES LMBC, this study also included this group, although with a small sample size, and this allowed to run a different experimental design that considered the independent effects of bilingualism and SES. Finally, to the best of our knowledge, this study was the first that explored the differential effect of SES and bilingualism on students exposed to French as the language of schooling, an intermediate opaque orthography, and might offer new insight for future cross-linguistic comparisons.

To note, the study focused on children attending from third to fifth grade of primary school. Therefore, the results referred to a consolidation phase of literacy acquisition, in

which school exposure might have had an effect in compensating discrepancies due to either bilingualism and SES (see Bonifacci et al., 2022). Studies on earlier stages of acquisition (i.e., first two years of primary school) with a longitudinal design are desirable to better understand how background variables and school exposure interact in shaping developmental trajectories.

Amongst the main limitations of the present study, it is important to acknowledge the limited sample size, particularly for the high-SES bilingual group. In addition, at a cognitive level, executive functions tasks were missing and should be included in further studies. Finally, we did not consider factors related to quality and length of exposure for the bilingual group. The study was conducted mainly on early bilinguals, and later exposure to French as a second language might show differential effects of SES and bilingualism.

The present study suggests some implications for the educational and clinical setting. In particular, it is important to increase sensitivity regarding the idea that bilingualism primarily affects tasks with a high load on lexical knowledge, and poor scores in these tasks shouldn’t be considered direct signs of learning disorders. On the other hand, SES has more widespread effects on cognitive, linguistic, and literacy skills, and children from low-SES backgrounds, independently from being bilinguals or monolinguals, might need additional educational opportunities to catch up the gap with high-SES peers.

References

Affranti, A., Tobia, V., Bellocchi, S. & Bonifacci, P. (2022). Spelling and writing skills in minority-language bilingual children exposed to a transparent orthography: Multilevel profiles and concurrent predictors. *International Journal of Bilingual Education and Bilingualism*, https://doi.org/10.1080/13670050.2022.2132813

Alegria, J., & Mousty, P. (1996). The development of spelling procedures in French-speaking, normal and reading-disabled children: Effects of frequency and lexicality. J*ournal of Experimental Child Psychology*, *63*, 312-338.

August, D., & Shanahan, T. (2006). Developing literacy in second-language learners. *Lessons from the Report of the National Literacy Panel on Language-Minority Children and Youth*. Mahway: Lawrence Erlbaum.

Bakeman, R. (2005). Recommended effect size statistics for repeated measures designs. *Behavior Research Methods*, *37(3),* 379-384.

Balladares, J., Marshall, C., & Griffiths, Y. (2016). Socio-economic status affects sentence repetition, but not non-word repetition, in Chilean preschoolers. *First Language*, *36*(3), 338-351.

Bellocchi, S. & Gogic, L. (2022). Prédicteurs concurrents de la compréhension en lecture chez les enfants bilingues de langue minoritaire apprenant à lire en français : Une étude préliminaire. *ANAE- Approche Neuropsychologique des Apprentissages chez l'Enfant, 179,* 463-472.

Bellocchi, S., Bonifacci, P. & Burani, C. (2016). Lexicality effect and stress assignment in bilingual children reading Italian as a second language. *Bilinguisme : Language and Cognition, 19*(1), 89-105.

Bellocchi, S., Cam, M., Albareda, M. & Monnier, C. (2020). Une proposition de questionnaire pour explorer l'histoire et les compétences linguistiques des enfants bilingues ou

apprenants le français – L2. *13ème Colloque International du Réseau Interuniversitaire de PSYchologie du DEVeloppement et de l'Education (RIPSYDEVE), 242*. Nancy: Université de Lorraine.

Bellocchi, S., Tobia, V. & Bonifacci, P. (2017). Predictors of reading and comprehension abilities in bilingual and monolingual children: A longitudinal study on a transparent language. *Reading and Writing: An Interdisciplinary Journal, 30*(6), 1311-1334.

Bender, R., & Lange, S. (2001). Adjusting for multiple testing—when and how? Journ*al of Clinical Epidemiology, 54*(4), 343-349.

Bialystok, E. (2009). Bilingualism: The good, the bad, and the indifferent. *Bilingualism: Language and Cognition, 12*, 3–11.

Bishop, D. V., Adams, C. V., & Norbury, C. F. (2004). Using nonword repetition to distinguish genetic and environmental influences on early literacy development: A study of 6-year-old twins. *American Journal of Medical Genetics Part B: Neuropsychiatric Genetics*, *129*(1), 94-96.

Bonifacci, P., & Tobia, V. (2016). Crossing Barriers: Profiles of Reading and Comprehension Skills in Early and Late Bilinguals, Poor Comprehenders, Reading Impaired, and Typically Developing Children. *Learning and Individual Differences, 47*, 17–26.

Bonifacci, P., & Tobia, V. (2017). The simple view of reading in bilingual language-minority children acquiring a highly transparent second language. *Scientific Studies of Reading*, *21*(2), 109–119.

Bonifacci, P., Canducci, E., Gravagna, G., & Palladino, P. (2017). English as a Foreign Language in Bilingual Language- Minority Children, Children with Dyslexia and Monolingual Typical Readers. *Dyslexia, 23*, 181–206.

Bonifacci, P., Compiani, D., Affranti, A. & Peri, B. (2021). Home Literacy and Numeracy Interact and Mediate the Relationship Between Socio-Economic Status and Early Linguistic and Numeracy Skills in Preschoolers. *Frontiers in Psychology, 12* :662265.

Bonifacci, P., Ferrara, I.C., Pedrinazzi, J., Terracina, F., & Palladino, P. (2022). Literacy Acquisition Trajectories in Bilingual Language Minority Children and Monolingual Peers with Similar or Different SES: A Three-Year Longitudinal Study. *Brain Science, 12(5):563.*

Bonifacci, P., Lombardo, L., Pedrinazzi, J., Terracina, F., & Palladino, P. (2020). Literacy Skills in Bilinguals and Monolinguals with Different SES. *Reading & Writing Quarterly, 36(3)*, 243-259.

Boonk, L., Gijselaers, H. J., Ritzen, H., & Brand-Gruwel, S. (2018). A review of the relationship between parental involvement indicators and academic achievement. *Educational Research Review, 24*, 10–30.

Calvo, A., & Bialystok, E. (2014). Independent effects of bilingualism and socio-economic status on language ability and executive functioning. *Cognition, 130*(3), 278–288.

Chiat, S., & Polišenská, K. (2016). A framework for crosslinguistic nonword repetition tests: Effects of bilingualism and socioeconomic status on children's performance. *Journal of Speech, Language, and Hearing Research*, *59*(5), 1179-1189.

Cummins, J. (2008). *BICS and CALP: Empirical and theoretical status of the distinction*. In N. H. Hornberger (Eds.), Encyclopedia of language and education (pp. 487–499). Berlin: Springer.

Deacon, S., Desrochers, A., & Levesque, K. (2017). Learning to Read French. In L. Verhoeven & C. Perfetti (Eds.), *Learning to Read across Languages and Writing Systems* (pp. 211-242). Cambridge : Cambridge University Press.

Dolean, D., & Cãlugãr, A. (2020). How reliably can we measure a child's true IQ? Socio-economic status can explain most of the inter-ethnic differences in general non-verbal abilities. *Frontiers in Psychology*, *11*, 2000.

Droop, M., Verhoeven, L. (2003). Language proficiency and reading ability in first and second language learners. *Reading Research Quarterly, 38* (1), 78 - 103.

Duan, B. (1997). *The robustness of trimming and Winsorization when the population distribution is skewed*. Unpublished dissertation. New Orleans: Tulane University.

Fayol, M., Totereau, C., & Barrouillet, P. (2006). Disentangling the impact of semantic and formal factors in the acquistion of number inflections: Noun, adjective and verb agreement in written French. *Reading and Writing: An Interdisciplinary Journal*, *19*, 717-736.

Grosjean, F. (1989). Neurolinguists, beware! The bilingual is not two monolinguals in one person. *Brain and language, 36*(1), 3-15.

Hakuta, K., Butler, Y., & Witt, D. (2000). *How long does it take English learners to attain proficiency?* (Policy Report 2000–1). San Francisco, CA: University of California, Linguistic Minority Research Institute.

Hassunah-Arafat, S.M., Aram, D. & Korat, O. (2021). Early literacy in Arabic: the role of SES, home literacy environment, mothers' early literacy beliefs and estimation of their children's literacy skills. *Reading and Writ*ing*: An Interdisciplinary Journal*, **34**, 2603–2625.

Hoff, E. (2003). *Causes and consequences of SES-related differences in parent-to-child speech*. In M. H. Bornstein & R. H. Bradley (Eds.), *Monographs in parenting series. Socioeconomic status, parenting, and child development* (pp. 147–160). Mahwah, NJ: Lawrence Erlbaum Associates Publishers.

Hoff, E. (2006). How social contexts support and shape language development. *Developmental Review, 26(1)*, 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. *Developmental Psychology, 49*(1), 4–14.

Hollingshead, A. A. (1975). *Four-factor index of social status*. Unpublished manuscript, Yale University, New Haven, CT.

INSEE (2021a). L'essentiel sur les immigrés et les étrangers. https://www.insee.fr/fr/statistiques/3633212

INSEE (2021b). Revenus et patrimoine des ménages. https://www.insee.fr/fr/statistiques/5371243?sommaire=5371304

Jacquier-Roux, M., Lequette, C., Pouget, G., Valdois, S., & Zorman, M. (2010). *BALE (Batterie Analytique du Langage Écrit)*. Grenoble, France : Laboratoire de Cogni-Sciences IUFM.

Jacquier-Roux, M., Valdois, S., Zorman, M., Lequette, C., & Pouget, G. (2005). ODEDYS : un outil de dépistage des dyslexies version 2 *[Dyslexia screening tool]*. *Grenoble : Laboratoire cogni-sciences, IUFM de Grenoble*.

Kaufman, A. S., & Kaufman, N. L. (2004). *Kaufman brief intelligence test*. Circle Pines, MN: AGS.

Kieffer, M. J. (2010). Socioeconomic Status, English Proficiency, and Late-Emerging Reading Difficulties. *Educational Researcher*, *39*(6), 484–486.

Kirby, J. R., Desrochers, A., Roth, L., & Lai, S. S. (2008). Longitudinal predictors of word reading development. *Canadian Psychology/Psychologie Canadienne, 49(2)*, 103.

Kovelman, I., Baker, S. A., & Petitto, L. A. (2008). Age of first bilingual language exposure as a new window into bilingual reading development. *Bilingualism: Language and Cognition*, *11*, 203–223.

Lefavrais, P. (2005). *Test de l'Alouette-R*. ECPA: Paris, France.

Lesaux, N. K., & Siegel, L. S. (2003). The development of reading in children who speak English as a second language. *Developmental psychology*, *39*(6), 1005-1019

Mani, A., Mullainathan, S., Shafir, E., and Zhao, J. (2013). Poverty impedes cognitive function. *Science 341*, 976–980.

Meir, N., & Armon-Lotem, S. (2017). Independent and Combined Effects of Socioeconomic Status (SES) and Bilingualism on Children's Vocabulary and Verbal Short-Term Memory. *Frontiers in Psychology, 25(8)*,1442.

Melby-Lervåg, M., & Lervåg, A. (2014). Reading comprehension and its underlying components in second-language learners: A meta-analysis of studies comparing first- and second-language learners. *Psychological Bulletin*, *140*(2), 409.

Monnier, C., Boiché, J., Armandon,P., Baudoin, S., & Bellocchi, S. (2022) Is bilingualism associated with better working memory capacity? A meta-analysis. *International Journal of Bilingual Education and Bilingualism, 25* (6), 2229-2255.

Paradis, J., Genesee F., & Cargo, M. B. (2021). *Dual language development and disorders: A handbook on bilingualism and second language learning*. *Third Edition*. Baltimore, MD: Brookes.

Perry, C., Ziegler, J.C., & Zorzi, M. (2007). Nested incremental modelling in the development of computational theories: the CDP model of reading aloud. *Psychological Review, 114,* 273-315.

Piquard-Kipffer, A., & Sprenger-Charolles, L., (2013). Early predictors of future reading skills: A follow-up of French-speaking children from the beginning of kindergarten to the end of the second grade (age 5 to 8). *L'Année psychologique, 4 (113)*, 491-521.

Roy, P., & Chiat, S. (2013). *Teasing apart disadvantage from disorder: The case of poor language*. In C.R. Marshall (Ed.), Current Issues in Developmental Disorders (pp.125-150). Hove, East Sussex: Psychology Press.

Saenz, T. I., & Huer, M. B. (2003). Testing Strategies Involving Least Biased Language Assessment of Bilingual Children. *Communication Disorders Quarterly*, *24*(4), 184–193.

Seeff-Gabriel, B. K., Chiat, S., & Roy, P. (2008). *Early repetition battery*. London: Pearson.

Seymour, P. H. K., Aro, M., & Erskine, J. M. (2003). Foundation literacy acquisition in European orthographies. *British Journal of Psychology, 94*, 143–174.

Sprenger-Charolles, L., & Casalis, S. (1995). Reading and spelling acquisition in French first graders: Longitudinal evidence. *Reading and Writing: An Interdisciplinary Journal*, *7*, 39-63.

Sprenger-Charolles, L., Siegel, L. S., & Bonnet, P. (1998). Reading and spelling acquisition in French: The role of phonological mediation and orthographic factors. *Journal of Experimental Child Psychology*, *68*(2), 134-165.

Thordardottir, E., & Brandeker, M. (2013). The effect of bilingual exposure versus language impairment on nonword repetition and sentence imitation scores. *Journal of communication disorders*, *46*(1), 1-16.

Thornton, A. M., Iacobini, C., & Burani, C. (1997). *BDVDB. Una base di dati sul vocabolario di base della lingua italiana* [BDVDB: A database for the Italian basic dictionary]. Rome: Bulzoni.

Treiman, R., & Kessler, B. (2005). Writing systems and spelling development. *The science of reading: A handbook*, 120-134.

Trochim, W.M. & Donnelly, J.P. (2006). *The Research Methods Knowledge Base*. 3rd Edition, Atomic Dog, Cincinnati, OH.

Verhoeven, L. (2000). Components in early second language reading and spelling. *Scientific Studies of Reading, 4*(4), 313-330.

Verpalen, A., Van de Vijver, F., & Backus, A. (2018). Bias in dyslexia screening in a Dutch multicultural population. *Annals of Dyslexia, 68*(1):43-68.

Wilcox, R. R. (2010). *Fundamentals of Modern Statistical Methods: Substantially Improving Power and Accuracy, 2nd Edn*. New York: Springer. Trochim, W. M., and Donnelly, J. P. (2006). The Research Methods Knowledge Base, 3rd Edn. Cincinnati, OH: Atomic Dog.

World Health Organisation. (2008). *59th general assembly*. In: Association WM, editor. Seoul, Korea: WHO.

Zhang, S., Breuer, E. O., Grünke, M., & Joshi, R. M. (2021). Using Spelling Error Analyses to Examine Individual Differences in German Students From Diverse Linguistic Backgrounds: A Latent Class Approach. *Journal of Learning Disabilities*, *55*(2), 123-137.

Zhao, J., Quiroz, B., Dixon, L. Q., & Joshi, R. M. (2016). Comparing bilingual to monolingual learners on English spelling: A meta-analytic review. *Dyslexia, 22(3)*, 193-213.

Table 1 *Descriptive statistics (standard and z scores) for each task as a function of groups: low-SES LMBC (Low_LMBC), low-SES monolinguals (Low_M), medium to high-SES LMBC (MHigh_LMBC), and medium to high-SES monolinguals (MHigh_M). Significant statistical effects from the 2x2 ANOVAs are also reported.*

	Low_LMBC (n=34)	**Low_M (n=25)**	**MHigh_M (n=42)**	**MHigh_LMBC (n=13)**	**Skweness**	**Kurtosis**	**Univariate effects**
	Mean *(SD)*	**Mean *(SD)***	**Mean *(SD)***	**Mean *(SD)***	**Stat *(Std error)***	**Stat *(Std error)***	
Nonverbal IQ (SS)*	102.5 *(12.63)*	101.2 *(12.07)*	111.14 *(10.55)*	109.92 *(9.39)*	.02 *(0.23)*	-.70 *(0.45)*	low-SES< MHigh-SES
Oral language							
Verbal knowledge (z)^	-0.55 *(1.23)*	-0.10 *(0.69)*	0.53 *(0.72)*	-0.07 *(0.70)*	-1.36 *(0.23)*	2.21 *(0.45)*	LMBC< M; low-SES< MHigh-SES
Morphosyntactic comprehension (z)*	-1.06 *(1.27)*	-0.73 *(1.11)*	0.52 *(0.79)*	-0.48 *(0.83)*	-0.54 *(0.23)*	-0.51 *(0.45)*	LMBC< M; low-SES< MHigh-SES
Pseudoword repetition (z)*	-1.57 *(1.98)*	-1.17 *(1.42)*	-0.85 *(1.39)*	-0.43 *(1.47)*	-0.82 *(0.23)*	0.16 *(0.45)*	low-SES< MHigh-SES
Reading							
Text Accuracy (z)*	-0.26 *(0.86)*	-0.50 *(1.21)*	-0.23 *(0.74)*	-0.35 *(0.88)*	-0.97 *(0.23)*	0.89 *(0.45)*	n.s.
Text Speed (z)*	-0.07 *(0.87)*	0.19 *(1.04)*	0.71 *(1.32)*	-0.40 *(0.65)*	0.68 *(0.23)*	0.32 *(0.45)*	LMBC< M
Irregular words Accuracy(z)*	-0.56 *(1.14)*	-0.29 *(1.11)*	0.31 *(1.01)*	-0.34 *(1.13)*	-0.40 *(0.23)*	-0.77 *(0.45)*	LMBC< M
Irregular words Speed(z)*	-0.04 *(1.44)*	-0.08 *(0.76)*	-0.03 *(1.06)*	-0.08 *(0.91)*	-0.13 *(0.23)*	1.84 *(0.45)*	n.s.
Regular words Accuracy(z)*	-0.65 *(0.88)*	-0.67 *(1.10)*	0.07 *(0.87)*	-0.58 *(0.93)*	-0.85 *(0.23)*	0.23 *(0.45)*	low-SES< MHigh-SES
Regular words Speed(z)*	0.06 *(1.38)*	-0.13 *(0.84)*	0.09 *(1.12)*	-0.05 *(1.02)*	0.13 *(0.23)*	1.62 *(0.45)*	n.s.
Pseudowords Accuracy(z)*	-0.46 *(0.75)*	-0.46 *(1.15)*	-0.18 *(0.92)*	-0.91 *(0.92)*	-0.79 *(0.23)*	1.92 *(0.45)*	n.s.
Pseudowords words Speed(z)*	0.06 *(1.03)*	-0.05 *(0.82)*	0.24 *(1.03)*	-0.06 *(0.93)*	-0.13 *(0.23)*	0.37 *(0.45)*	n.s.
Spelling							
Irregular words Accuracy(z)*	-0.88 *(0.99)*	-0.87 *(1.43)*	-0.60 *(1.02)*	-0.97 *(1.11)*	-0.42 *(0.23)*	-0.16 *(0.45)*	n.s.
Regular words Accuracy(z)*	-1.25 *(1.52)*	-0.69 *(1.58)*	-0.35 *(0.92)*	-0.79 *(1.18)*	-0.90 *(0.23)*	0.67 *(0.45)*	n.s.
Pseudowords Accuracy(z)*	-1.02 *(1.52)*	-0.77 *(1.14)*	-0.32 *(1.21)*	-0.15 *(1.07)*	-1.17 *(0.23)*	1.99 *(0.45)*	LMBC< M

Note: LMBC = Language-Minority Bilingual Children; M= monolingual children. Low_SES = low SES children; ; MHigh_SES = medium to high SES children; Low_LMBC= low-SES LMBC; Low_M = low-SES monolinguals; MHigh_LMBC = medium to high-SES LMBC; MHigh_M = medium to high-SES monolinguals.

^z-scores obtained on total sample's scores according to school level*z-scores obtained from manual.