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The relations of SES and literacy-related oral and written language skills after one year of reading instruction – evidence from novice readers of Arabic

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Abstract

The relations between socioeconomic status (SES) and language skills at the onset of reading acquisition has not received much attention in research. In this study, a standardized battery of oral and written language tests was administered to 127 Arabic-speaking children at the end of first grade. SES-related differences were found in a line of oral language measures (vocabulary, syntax, morphology, and listening comprehension), but not in phonological awareness (PA) and rapid automatized naming (RAN), nor in any of the reading components (decoding, word reading, reading comprehension and orthographic knowledge). These findings point to a distinction between two groups of language skills with regard to their relations with SES in the first year of reading instruction. The results imply that SES should not be regarded as a mediating factor in the development of PA, RAN and reading in first grade among novice readers of Arabic.

Keywords: Socioeconomic status (SES); language components; vocabulary gap; reading acquisition

Introduction

Socio-economic status (SES) is a broad and a complex structure that captures the social and economic levels of the individual. From a theoretical perspective, SES is thought to

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provide an indication of the resources available to a person (Saegert, Adler, Bullock, Cauce, Liu & Wyche, 2007). Although SES has been extensively studied in the literature, there is an ongoing debate on how to measure it. Traditionally, SES is operationalized as a composite measure including parental education and family income (Nakhaie & Kazemipur, 2013; Rodriguez-Hernandez, Cascallar & Kyndt, 2020). While each of these dimensions may provide a partial indicator of the resources available to the person, a composed measure considering these different dimensions is often used as an indication of SES.

SES has been found to be related to skills of the oral and the written language (Dailey & Bergelson, 2022; Hart & Risley, 1995, 2003; Hoff, 2003, 2013). Overall, high SES has been suggested to be related to better language development, whereas low SES has been linked to lower language skills (Huttenlocher, Waterfall, Vasilyeva, Vevea & Hedges, 2010; Sperry, Sperry & Miller, 2019). These relations have been explained by differences in the extent of opportunities children receive to stimulate their learning (Longo, McPheran Lombardi & Dearing, 2017) and develop language skills (Fernald, Marchman & Weisleder, 2013; Hart & Risley, 2003) in low-SES families in comparison to high-SES families. It is yet unclear, however, to what extent SES is related to the various written and oral language skills, and whether SES-related differences in these language skills are to be expected at any grade-level.

This study focuses on the relations of SES with reading and reading-related oral language skills in the first year of formal reading acquisition among readers of Arabic. In the following, the motivation to focus on these language skills at this point of development and in this population is explained. First, the rationale to explore reading and reading-related language skills lies in the fact that reading is a complex competence that greatly relies on different reading components and oral language skills. SES may be related to any of these components and skills to a different extent. Unveiling the relations of SES with the different reading components and the related oral language skills may shed light on the nature of the SES-language relations.

The main reading components which underlie reading capacity are decoding, reading fluency and reading comprehension (Fodor, 1985; Vellutino, Fletcher & Snowling, 2004). Decoding refers to the process of translating graphemes into their corresponding sounds. This ability is commonly assessed with pseudoword reading tasks, in which accuracy and speed in reading the pseudowords are recorded (Ziegler & Goswami, 2005). Fluency in reading commonly relates to a combined measure of accuracy and speed in reading of real words or texts (for a broader concept of fluency in reading see Katzir, Kim, Wolf, O'Brien, Kennedy, Lovett & Morris, 2006). These components are essential in reaching the goal of reading – i.e., reading comprehension, which is usually tested by presenting questions relating to written texts. Another component of reading is the acquisition of orthographic knowledge, which is usually tested using spelling or orthographic choice tasks (e.g., tasks that require the choice of the correct spelling of a word out of two or more possibilities).

These components of reading have been found to be related to a line of oral language skills (Asadi, 2020). The two language skills which stand out, showing large effect sizes in their relationship with reading acquisition across meta-analyses, ages, and orthographies, are phonological awareness (PA) and Rapid Automatized Naming (RAN) (e.g., Saiegh-Haddad & Geva, 2008; Schiff & Lotem, 2011; Torgesen, Wagner & Rashotte, 1994; Wolf & Katzir-Cohen, 2001). Most researchers place PA at the basis of reading capacity (Snowling, 2000). PA refers to explicit awareness of the speech-sound structure of language units (Stanovich, 1988). Accordingly, this skill is tested by asking participants to manipulate the sounds of given words (e.g., isolating, omitting or replacing the sounds

composing words). Phonological awareness at the level of phonemes develops mainly during the first year of reading instruction, irrespective of age (Share, 1995), and is thought to be critical for reading accuracy due to its involvement in translating written words into spoken sounds (Grapheme-Phoneme correspondence - GPC). RAN is a skill thought to represent the speed of access to phonological representations stored in the long-term memory (Torgesen et al., 1994). RAN tasks (Denckla & Rudel, 1976) typically involve the presentation of a matrix of familiar stimuli (e.g. objects, colors, letters or digits), which participants are asked to name as fast and as accurately as they can. Performance in such tasks has been shown to predict reading fluency in a variety of orthographies (Johnston & Kirby, 2006; Saiegh-Haddad, 2005; Taibah & Haynes, 2010). Reading fluency has been suggested to be affected by the quality and speed with which information is processed – a capacity which is thought to be captured using the RAN task (e.g., Wolf & Bowers, 1999).

Additional language skills have been found to be related to reading (Authors, 2022). These are listening comprehension, morphological, semantical and syntactical skill. Listening comprehension refers to one's ability to listen and understand spoken language of multiple utterances and oral texts (Kim & Pilcher, 2016) – a capacity that has been shown to be closely linked to reading comprehension (e.g., Catts, Adlof & Weismer, 2006; Gough & Tunmer's, 1986; Joshi, Ji, Breznitz, Amiel & Astri, 2015; Shankweiler, Lundquist, Katz, Stuebing, Fletcher, Brady & Shaywitz, 1999). Morphological knowledge, i.e., the understanding of the morphological structures of the language, has also been found to play an essential role in the reading of various orthographies (Abu-Rabia, 2007; Nunes, Bryant & Bindman, 2006; Ravid & Malenky, 2001; Saiegh-Haddad & Geva, 2008; Schiff & Ravid, 2007). It has also been shown that the representation of written morphemes become part of the orthographic knowledge (Saiegh-Haddad, 2013). Morphological knowledge is commonly tested by asking participants to relate to the morphemes composing morphologically complex words. Semantic knowledge (e.g., vocabulary) is considered the core component of language development (Bowne, Yoshikawa & Snow, 2017). There is a consensus among researchers that vocabulary predicts reading development across school years and that lexical quality plays a critical role in comprehension (Perfetti, 2007). Syntactic knowledge is involved in extracting the relationship between words and the internal grammatical structure within sentences, and is hence an important factor in text comprehension (Asadi, 2020; Kim, 2016; Oakhill, Cain & Bryant, 2003; Pizzioli & Schelstraete, 2013).

Several considerations suggest that SES would have distinct relations to these reading components and oral language skills. As aforementioned, the SES-language development relations have been explained by differences in the extent of opportunities children receive to stimulate their learning (Longo et al., 2017) and develop linguistically (Fernald et al., 2013; Hart & Risley, 2003). In this case, language skills which are systematically taught in school, such as reading and writing, may be less affected by SES than language skills which receive less formal instruction (e.g., listening comprehension).

Differences in the relations of SES with the various reading-related oral language skills may also be found: some scholars have claimed that both PA and RAN are 'universal skills' that consistently underlie reading development across languages and orthographies (Kim, 2009; Saiegh-Haddad, 2019; Share & Levin, 1999; Song, Georgiou, Su & Hua, 2016; Tibi & Kirby, 2018). This may suggest that, unlike other language components (morphological, semantical and syntactical knowledge), which are thought to be acquired with age, and influenced by extent of exposure of children to literacy and cultural/contextual

knowledge, PA and RAN might be related more to the cognitive domain than to the specific language domain. Accordingly, while PA may be related to working memory capacity (Baddeley, 2000), RAN may be related to general speed of processing (Brenzitz, 2006).

Second, the rationale guiding the focus of this study on the examination of first graders is explained. Schooling – and, more specifically, reading experience – may be important mediators of the relations between SES and language skills. While some models of reading competence focus on the reading-related language skills (e.g., PA, morphology, orthography, vocabulary, syntax) and the interaction between them (e.g., Adams, 1990), other models relate also to environmental factors that contribute to reading above and beyond the impact of cognitive-language skills (e.g., RAND Reading Study Group, 2002). In line with the latter model, and in accordance with the suggested “Matthew effect” in reading (Stanovich, 1986), children with better language and reading skills may read more, and as a result have more opportunities to improve these skills – a process which may further widen the gap between low and high SES children. On the other hand, an opportunity arises to narrow such a gap when children from low SES encounter a stimulus-rich linguistic environment as they enter school.

Finally, the rationale guiding the focus on readers of Arabic is that the Arabic language has a unique characteristic of diglossia, which refers to the existence of two forms of the same language (Ferguson, 1959): the spoken Arabic (SA) and the literary Arabic (LA, also referred to as “Modern Standard Arabic”, see Saiegh-Haddad & Joshi, 2014) versions, which are used in different situations. Children mainly use the spoken version for oral communication until the pre-school period, and then start to acquire and use the literary version through formal and more systematic instruction at school. The discrepancy in the phonological, morphological, semantic, and syntactic levels between the two forms (Saiegh-Haddad, 2003) may negatively impact reading acquisition in Arabic (Asadi & Abu-Rabia, 2021; Saiegh-Haddad, 2003, 2004, 2007). Possible SES-related differences in the extent of exposure to the literary language before school entry may have a special role in the acquisition of reading Arabic in first grade.

The relations of SES with reading and with reading-related oral language skills in the early stages of reading acquisition

In the following, we review the existing knowledge on the relations of SES with reading and with reading-related oral language skills in the early phases of reading acquisitions. As in some countries the last year of kindergarten includes already explicit reading instruction or intensive early literacy activities, we relate here to studies carried out with kindergarten and/or first grade children.

The relations between SES and reading skills has been documented in several studies (e.g., Molfese, Modglin & Molfese, 2003). In a longitudinal study of a large sample of American children, who were tested several times between kindergarten and first grade, McCoach, O’Connell, Reis and Levitt (2006) found that SES was a powerful predictor of reading at the beginning of kindergarten and of improvement in reading during the summer. Nonetheless, SES had a minimal effect on improvement in reading during school time. The evaluation of reading included, however, a composite score which did not allow looking separately into the components of reading. Other studies on early reading acquisition allow for a more detailed inspection of the relations between SES and the components of reading. For instance, Raag, Kusiak, Tumilty, Kelemen, Bernheimer

and Bond (2011) found SES-related differences in several early literacy tasks at fall time in the last year of kindergarten. The measures included letter identification, letter-sounds assessments and reading of short texts. These differences were no longer evident when the children were tested in spring time of the same year. SES-related differences in word recognition were marginally significant in both testing points. Fung and Chung (2020) reported significant differences in word reading in two testing points during kindergarten. However, as reading instruction progressed, these differences were reduced. In their study of Arabic speaking children, Hassunah-Arafat, Korat, Aram and Saiegh-Haddad (2017) found significant correlations of SES with kindergarten early literacy measures (letter naming, connecting letters and sounds, and matching between written words and pictures) and with first grade word writing and text reading. However, in a path analysis model, SES had a positive effect on the early literacy measures administered in kindergarten, with a reduced effect on first grade word writing, and no direct effect on first grade text reading. Noble, Farah and McCandliss (2006) found significant correlations between SES and basic reading skills, including decoding and word reading, as well as with reading comprehension. At the same time, in a hierarchical regression analysis, SES contributed a unique amount of variance to explaining single word reading and passage comprehension, but not decoding. These results suggest that early reading instruction may result in reduced SES-related differences in the components of reading.

In a recent study by Ozernov-Palchik et al. (2019) of English-speaking kindergarten children, SES was associated with performance on PA and RAN Tasks. Similarly, at the beginning of first grade, Romanian speaking children from a low SES background performed significantly lower on RAN and PA (Dolean, Melby-Lervåg, Tincas, Damsa & Lervåg, 2019). A similar disadvantage of low-SES children in PA was evident in a study of Chinese kindergarten children (Fung & Chung, 2020). At the same time, this gap disappeared at a later stage of kindergarten after the children had gained experience with reading instruction. Similarly, a reduction in SES differences in PA with reading experience has been reported with regard to English speaking kindergarten children who have been tested several times in the course of the final kindergarten year (Raag et al., 2011). Nevertheless, significant correlations between PA and SES have been reported in first grade in speakers of Arabic and of English (Hassunah-Arafat et al., 2017; Noble et al., 2006). Notably however, Hassunah-Arafat et al. (2017) reported a rather weak standardized coefficient for path estimates of direct effects between SES and first grade PA. These findings may point to reduced SES-related differences in PA at the first year of reading instruction. Less is known about possible changing relations between RAN and SES during this stage.

With regard to the additional language skills related to reading-acquisition, while SES-related differences in morphological awareness have been documented in later school grades (Rassel, Facon & Casalis, 2021; Schiff & Lotem, 2011), information on the initial stages of reading acquisition is limited. In the study by Fung and Chung (2020), no difference was obtained in morphological awareness between low- and middle-SES children at the initial stages of reading acquisition of Chinese.

Early studies have shown that SES correlates with language exposure (input) and vocabulary growth (output). Hart and Risley (1995) compared the number of words spoken to young children from socio-economically diverse backgrounds and estimated that children from the lower-classes hear 30 million fewer words than their middle-class counterparts during the early years of life. This discrepancy was found not only in the quantity of words, but also in the quality of the speech (Weisleder & Fernald, 2013). In an effort to identify the mechanisms by which SES influences vocabulary development, Hoff

(2003) found that properties of maternal speech (e.g., quantity, lexical richness, and sentence complexity), which differed as a function of SES, accounted for vocabulary growth. Moreover, Huttenlocher, Waterfall, Vasilyeva, Vevea and Hedges (2010) analyzed the relation of demographic factors (e.g., SES, birth order, gender) to children's language and found that while SES was a highly significant predictor of children's language outcomes, the effect of SES was smaller when caregiver speech was included, suggesting that SES effects may be, at least partially, mediated by caregiver speech. Notably, however, Hart and Risley's "30-millions word gap" has been recently criticized by the finding of variability in vocabulary exposure within each socioeconomic stratum. For example, Sperry et al. (2019) found that children from one of their lower-class groups were not only exposed to more words than children from their other lower-class groups, but were exposed to a higher number of words than the upper-class groups in their study and in Hart and Risley's study. In a recent meta-analysis, Piot, Havron and Cristia (2021) evaluated the association between SES and children's experiences measured with the Language Environment Analysis (LENA) system. In support of Sperry et al. (2019) their findings indicated that when controlling for caregiver speech, the association between SES and linguistic measures was small.

As far as syntactic knowledge is concerned, in a large sample of kindergarten children (ages three to five years), Levine et al. (2020) found a significant SES effect on syntax. Of note is that the significant effect of SES was comparable for all language components tested, which were – in addition to syntax, also vocabulary and language processing. The latter evaluates how children learn new words and generalize syntactic structures to newly learned words. The magnitude of the difference between low and high SES groups in these skills was approximately 1.5–2 standard deviations, indicating that by the age of five, the language skills of low SES children were one to two years behind those of their peers. Similar gaps in syntactic skills at the age of five were reported elsewhere (for review see Pace, Luo, Hirsh-Pasek & Golinkoff, 2017).

Because listening comprehension relies heavily on verbal abilities including vocabulary, syntax, and morphology (Gottardo, Mirza, Koh, Ferreira & Javier, 2018) for which SES differences have been described above, there are likely to be SES-related differences also in listening comprehension. However, research regarding such differences in listening comprehension remains rare. First, research on early childhood focuses more on the components of language comprehension (i.e., vocabulary, syntax, morphology) and less on language comprehension as a whole. Second, starting from the early stages of reading acquisition, research clearly focuses on differences in reading comprehension and not on listening comprehension. One study examining differences in listening comprehension among preschool Czech children found that children from low SES backgrounds performed significantly lower than children from middle SES backgrounds (Zápotočná, Urban & Urban, 2020). Further support for possible differences in language comprehension is in the large number of studies focusing on improving the listening comprehension of children from low SES backgrounds (for a review see a recent meta-analysis by Fikrat-Wevers, van Steensel & Arends, 2021).

The study's goals

In the current study, we wish to further clarify the relations of SES and oral and written language skills at the early stages of reading acquisition among readers of Arabic. To this end, a comprehensive battery of standardized tests addressing both oral and written

language skills was administered to a sample of 127 Arabic speaking children at the end of first grade, which was their first year of formal reading instruction.

With the current study, we add to the reviewed literature in the following manner: we tested the relations of SES with a broad range of literacy-related oral and written language skills within a representative sample of first graders. The skills tested included PA, RAN, morphological and syntactic knowledge, vocabulary, listening comprehension, word reading, decoding, orthographic knowledge and reading comprehension. In addition, readers of Arabic were tested. Considering the population of readers of Arabic in the world, this is an understudied language and orthography. As the characteristics of the orthography being acquired has been found to have an effect on various aspects of literacy development (Seymour, Aro, Erskine & Collaboration with COST Action A8 Network, 2003), exploring language development in speakers and readers of a variety of languages and orthographies is important in trying to understand universal and language-specific literacy-related factors. Third, a standardized battery of language and reading tests has only recently been developed in the Arabic language (for more details see Asadi, Shany, Ben-Simon & Ibrahim, 2014; Asadi, Khateb, Ibrahim & Taha, 2017). To the best of our knowledge, this is the only standardized battery available for this language. The use of such a battery may add to the previous study reported here on Arabic speaking children (Hassunah-Arafat et al., 2017).

Research questions

We outlined two research questions for the current research. (1) What are the relations between SES, linguistic skills, and reading ability at the end of first grade among readers of Arabic? (2) Do low SES children differ from medium and high SES children in linguistic skills and reading abilities at the end of first grade?

Based on the reviewed literature, we expected to find significant correlations between SES and the skills which heavily rely on prior knowledge or language experience, including vocabulary, morphological and syntactic knowledge and listening comprehension. Reduced relations were expected between SES and language skills which are being acquired in the course of the first year of reading instruction, as SES-related gaps may have not yet been established for these skills. These include PA, decoding, word reading, orthographic knowledge and reading comprehension. The available literature did not allow a specific assumption relating to the relations between SES and RAN.

Method

Participants

Participants were 127 Arabic-speaking children in first grade, including 57 (44.8%) boys and 70 (55.2%) girls, recruited to represent the cultural, ethnic, and religious diversity of the Arabic-speaking society in Israel. Their age ranged from 6.1 to 7.9 years ($M = 6.9$; $SD = 0.52$). The research was approved by the Chief Scientist of the Israeli Ministry of Education, which evaluated the ethical aspects needed for this research. In addition, all parents gave a written consent for their children to participate in this study, and all children provided verbal assent to their participation.

The sampling was conducted by the Chief Scientist of the Israeli Ministry of Education while taking into consideration the representative socioeconomic parameters of the

Israeli Arabic speaking schools (low, medium, and high). Twenty-three regular schools from six Israeli districts were selected. Operationally, the Chief Scientist classification of schools into nominal SES categories weighs the following parameters: individual's socioeconomic background while weighting parents' education (40%), level of income (20%), peripherality of school (20%), and migration from distressed countries (20%). The latter two parameters were added to the common operationalization of SES index due to the characteristics of the population in Israel. In terms of school peripherality, the more geographically distant the school is from urban areas, the more effort is required of the school to enable equal opportunities for its students. Schools located in the geographical periphery and rural areas have difficulty finding teachers in certain subjects, and find it very difficult to address the needs of a diverse population of students who cannot choose between different educational institutions. As for the subject of immigration, teaching students with a migration background requires resources to deal with language barriers and with possible social and academic challenges, which are often associated with migration. These challenges may be further emphasized in case of migration from distressed countries (e.g., Offer, 2005). These two parameters of SES – periphery and immigration – further interact, given the fact that students with a migration background are generally concentrated in the same peripheral schools (Schleicher, 2015).

The SES index is calculated for each student and is classified by a decile, from the lowest to the highest. The index value of a school is the average of the deciles of the students studying in it. Operationally, low SES schools fall between the 8th-10th deciles; medium SES schools fall between the 4th-7th deciles, and high SES schools fall between the 1st-3rd deciles.

In the second stage of the sampling, a specific class was selected from the grade level in each of the selected school. In the third stage, five to six participants were recruited by the researchers from each of the selected classes by taking every fifth child from the alphabetical list of names of each grade. This selection provided 127 first graders, of whom 25 children received supplementary reading instruction. The proportion of children receiving this instruction was evenly distributed among the SES groups: low SES ($n = 9$), medium SES ($n = 8$), and high SES ($n = 8$). Similar gender distribution ($\chi^2_{(2,127)} = 0.65, p = .722$) and similar age distribution ($\chi^2_{(40,79)} = 37.82, p = .568$) were evident among SES groups. All children in the selected grades participated in this study, except for children with physical and mental disabilities based on their school reports. The children did not receive any type of incentive to take part in this research.

Measures

In the current study a comprehensive battery of standardized normed-based tests was administered in both oral and written Arabic to assess language and reading skills (for more details see Asadi et al., 2014).

Linguistic skills

1. **Phonological awareness** was assessed using two measures:

a) **Phonemic deletion.** This task examined the ability to perform phonemic deletion at the beginning and the end of words. A list of 12 words was used. The words (mono- and disyllabic, mostly shared by SA and LA and pseudowords) were read individually

to the participants, who had to repeat each word and then pronounce it again after deleting a specific sound. The reliability of the test (α) was 0.83.

b) Phonemic segmentation. This test examined the ability to segment the words into their basic sounds. A list of 14 words was used. The items were mono- and disyllabic and represented LA, SA, and pseudowords. The child had to repeat each word and to segment it into sounds. The reliability of the test (α) was 0.91.

The phonological awareness index was calculated as an average of accuracy achieved in these two measures.

2. **Rapid automatized naming (RAN)** was examined using an adapted form of Denckla and Rudel's (1976) RAN tests. Three tests were administered, each comprising 50 stimuli. Naming time was recorded separately for each test. The tests included:

a) Arabic digits naming: The test consisted of five digits (1, 5, 9, 3, and 7) repeated ten times.

b) Arabic letters naming: The test consisted of five Arabic letters (س/ا/ع/ت/ي) repeated ten times.

c) Object naming: The test consisted of five pictures (watch, chair, banana, frog, and candle) repeated ten times.

3. **Morphological knowledge** was assessed using four tests that examined different aspects of the Arabic morphological system using items from LA:

a) Inflecting verbs and nouns. This test examined the ability to inflect verbs and nouns. A list of 19 items was used. The child was required to inflect the root by gender, number, and tense and to inflect the noun by gender and number. The reliability of the test (α) was 0.91.

b) Derivation of words in context. The test examined the ability to derive words according to a given root. A list of 14 items was used. The child heard a sentence and was required to complete the sentence with a noun according to a given root. The reliability of the test (α) was 0.82.

c) Root awareness. The test examined the children's awareness of the words' roots. A list of 26 items was used. In each item, three words were presented and read to the child, who marked the item that did not relate to the same root "family". The reliability of the test (α) was 0.89.

d) Pattern awareness. A list of 19 items was used to examine awareness of morphological patterns. In each item, two words were presented and read to the child, who was required to identify whether or not the words were related to the same morphological pattern. The reliability of the test (α) was 0.78.

The morphological awareness index was calculated as an average of the accuracy achieved in the four subtests.

4. **Semantic knowledge** was assessed using receptive and expressive vocabulary tests:

a) Receptive vocabulary. Based on the Peabody Picture Vocabulary Test (Dunn, 1985), a list of 50 items was used to evaluate the semantic knowledge at the receptive

level. The child heard a word in LA and was required to designate a corresponding picture out of four pictures. The reliability of the tests (α) was 0.82.

b) **Expressive vocabulary.** The test examined the children's semantic knowledge at the production level. A list of 26 items was used. The child heard a word and was required to elicit its opposite using LA. The reliability of the test (α) was 0.89.

The semantic knowledge index was calculated as an average score of accuracy in the two vocabulary tests.

5. **Syntactic knowledge** was examined using a test, which addressed the sensitivity to syntactic rules and the ability to judge the correctness of sentences presented by the examiner. A list of 24 items from LA was used. The items included correct and incorrect sentences of three to nine words. Errors may have been reflected in the order of the words in the sentence, in subject-verb agreement, prepositions, and conjunctions. The reliability of the test (α) was 0.60.
6. **Listening comprehension** was examined with a test of 25 sentences, each including between six and 12 words in LA, followed by multiple choice comprehension questions. The items were read out by the examiner. The reliability of the test (α) was .80.

Reading measures

1. **Vowelized word reading.** A list of 24 vowelized words was used to examine reading accuracy and fluency. The selected items represented different levels of familiarity (familiar, moderate, and low), length (one to four syllables), and a variety of morphological structures and patterns. Each participant was asked to read the words as accurately as possible in his/her own comfortable rate. The final score of accuracy reflected the correct words read in percentages. Reading fluency was computed as the number of words correctly read per minute. The reliability of the test (α) was 0.93.
2. **Vowelized pseudowords.** A list of 20 items was used to examine decoding skills. The pseudowords were constructed based on the phonological structure of real words and represented several morphological patterns in Arabic. The length of the items ranged from one to four syllables. Accuracy in decoding was represented by a score of items correctly read in percentages. Decoding fluency was computed as the number of items read correctly in one minute. The reliability of the test (α) was 0.95.
3. **Word spelling.** The test included a list of 16 items that were selected based on their prevalence in learning materials. The items used included verbs and nouns (one to four syllables in length), which represented inflectional and derivational forms, as well as specific knowledge of orthographic rules. The words were dictated individually to the participants. The score of the spelling task represented the correct words in percentages. The reliability of the test (α) was 0.92.
4. **Orthographic choice.** This test examined the ability to identify orthographically illegal patterns (pseudo-orthographic). A list of 40 items was used. The items represented a variety of nouns and morphological patterns in the correct and incorrect forms. The score of the orthographic choice task represented the correct responses in percentages. The reliability of the test (α) was 0.80.
5. **Reading comprehension** (sentences and text comprehension). Sentence comprehension was tested using 20 items. Each item included a picture presented with two

sentences. The participants were asked to select the sentence matching the picture. In an additional task, a text was presented to participants, which they were required to read silently, and answer 20 multiple choice questions. The participant's reading comprehension score was based on the total number of correct answers in the two tasks (sentence and text comprehension), represented in percentages. The reliability of the test (α) was .87.

Procedure

The participants were tested individually by the examiners. The testing took place in a quiet schoolroom over three sessions (one hour each). To minimize possible effects of order, the different tasks were administered in a counterbalanced order of administration. All examiners were professionals in communication disorders and learning disabilities. Participants were tested in May (i.e., towards the end of the first grade) in order to minimize differences between schools during this early stage of reading acquisition. In addition, to avoid missing data, the examiners added to the planned testing days additional testing appointments. These were used to complete data collection from the few children who were absent from the original test appointments. Thus, there was no attrition of participants or missing data.

Results

Preparation of the data and sample's characteristics

The study utilized several tasks to measure the same construct in order to obtain as comprehensive a picture as possible. For data analyses, general indices were derived after a Pearson correlation analysis or reliability test confirmed that measures of the same construct were highly correlated. Correlation analysis demonstrated that the two tests of PA were significantly correlated ($r=.61$, $p<.001$) and so were the two tests of vocabulary ($r=.76$, $p<.001$). A reliability test was conducted for the three measures of RAN (Cronbach's $\alpha = 0.71$) and the four measures of morphological knowledge (Cronbach's $\alpha = 0.70$).

Means and standard deviations for the entire sample are presented in [Table 1](#). For most variables, the scores are presented in percentages of correct responses, except for fluency (presented in correct words per minute) and RAN (presented in items per minute). All variables were screened for skewed measurements and kurtosis. These demonstrated that the majority of variables were normally distributed, except for words reading fluency (skewed level = 1.43 and kurtosis = 2.33).

What are the interrelations between SES, linguistic skills, and reading components?

[Table 2](#) shows the Pearson correlations between SES, linguistic skills, and reading measures in the entire sample. The results demonstrate significant correlations between all the linguistic skills and the reading measures. Analyzing the interrelations between SES, linguistic skills, and reading measures revealed that SES had significant correlations with morphology ($r = .27$, $p < .01$), vocabulary ($r = .33$, $p < .001$), syntax ($r = .21$, $p < .05$) and listening comprehension ($r = .26$, $p < .01$). In contrast, SES did not correlate with PA, RAN, or any of the reading measures.

Table 1. Descriptive Statistics for the Entire Sample

	Mean	SD	Min	Max	Skewness	Kurtosis
Linguistic skills						
Phonology	57.3%	25.4	0	100	-0.49	-0.59
RAN	48.6	14.78	13.22	91.84	0.19	-0.02
Morphology	56.04%	16.91	21.28	95.11	-0.03	-0.65
Vocabulary	53.2%	16.88	17.2	94.8	0.21	-0.67
Syntax	66.77%	13.07	33.33	100	0.05	-0.34
Listening comprehension	54.43%	18.28	24	92	0.03	-1.19
Reading skills						
Words reading accuracy	66.73%	29.44	0	100	-0.84	-0.49
Words reading fluency	10.27	9.74	0	49.29	1.43	2.33
Pseudowords reading accuracy	61.98%	34.25	0	100	-0.65	-1.02
Pseudowords reading fluency	8.63	7.58	0	31.58	0.87	0.17
Spelling	64.32%	30.1	0	100	-0.72	-0.87
Orthographic choice	70.63%	24.88	25	97.5	-0.58	-0.09
Reading comprehension	64.75%	18.52	22.5	100	-0.24	-0.79

Do low SES children differ from medium and high SES children in linguistic skills and reading abilities?

In order to test this question, ANOVA analyses were carried out with SES as a fixed factor (3 levels: high, medium and low SES) and the language and reading skills as dependent variables. Table 3 shows the descriptive statistics and the results of the ANOVA analyses. High SES children outperformed low SES children in measures of morphology ($F_{(2,125)} = 4.95, p < .01, \eta^2 = .07$) and vocabulary ($F_{(2,125)} = 7.64, p < .001, \eta^2 = .11$). Children from high SES outperformed children from medium- and low -SES in the measure of syntax ($F_{(2,125)} = 3.78, p < .05, \eta^2 = .03$). Children from high- and medium- SES outperformed low SES children in listening comprehension ($F_{(2,125)} = 5.26, p < .01, \eta^2 = .08$). In contrast, no significant SES-related differences were found in PA ($F_{(2, 125)} = .15, p = .86$; CIs for the three SES groups: high 50.38 to 66.6, medium 49.96 to 62.2; low 48.4 to 63.03), or RAN ($F_{(2, 125)} = 2.1, p = .12$; 95% CIs for the three SES groups: high 47.96 to 57.24, medium 41.74 to 51.02, low 42.96 to 51.32). The overlapping of CIs supports the null hypothesis of no difference between the groups (Hespanhol, Vallio, Costa & Saragiotto, 2019).

As far as the reading skills are concerned, we found no significant SES-related differences in word reading (accuracy: $F_{(2, 125)} = 1.7, n.s.$; fluency: $F_{(2, 125)} = 1.87, n.s.$), pseudoword reading (accuracy: $F_{(2, 125)} = 1.5, n.s.$; fluency: $F_{(2, 125)} = 1.38, n.s.$), spelling ($F_{(2, 125)} = .60, n.s.$), orthographic choice ($F_{(2, 125)} = .28, n.s.$), and reading comprehension ($F_{(2, 125)} = .58, n.s.$).

Discussion

The present study examined SES-related correlates and differences in literacy-related oral and written language skills among 127 Arabic readers at the end of first grade. To the best

Table 2. Correlations Statistics for the Entire Sample

	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1 Socio-economic status (SES)	1													
2 Phonology	.05	1												
3 RAN	.15	.45***	1											
4 Morphology	.27**	.65***	.46***	1										
5 Vocabulary	.33***	.46***	.37***	.72***	1									
6 Syntax	.21*	.28**	.21*	.43***	.58***	1								
7 Listening comprehension	.26**	.45***	.29**	.62***	.73***	.43***	1							
8 Words reading accuracy	.12	.80***	.46***	.69***	.55***	.31**	.49***	1						
9 Words reading fluency	.14	.65***	.53***	.69***	.60***	.31**	.52***	.70***	1					
10 Pseudowords reading accuracy	.15	.81***	.46***	.69***	.55***	.34***	.47***	.94***	.69***	1				
11 Pseudowords reading fluency	.15	.70***	.54***	.67***	.56***	.32***	.47***	.73***	.93***	.78***	1			
12 Spelling	.09	.75***	.48***	.68***	.54***	.30**	.44***	.88***	.67***	.86***	.70***	1		
13 Orthographic choice	.07	.52***	.34***	.49***	.44***	.36***	.37***	.48***	.53***	.47***	.53***	.48***	1	
14 Reading comprehension	.09	.60***	.45***	.75***	.69***	.49***	.67***	.67***	.64***	.65***	.62***	.69***	.50***	1

Note. *** $p < .001$.

** $p < .01$.

* $p < .05$.

Table 3. Descriptive statistics, ANOVA analyses and Tukey's post hoc comparisons by SES level

	Low SES (n=48)		Medium SES (n=40)		High SES (n=39)		Significance	Partial Eta Squared	Differences
	Mean (SD)	95%CI Lower Upper	Mean (SD)	95%CI Lower Upper	Mean (SD)	95%CI Lower Upper			
Linguistic skills									
Phonology (%)	55.72 (24.6)	50.37 66.6	58.1 (27.1)	49.95 66.18	58.48 (25.2)	48.4 63.03	$F_{(2,125)} = .15, p = .86$	—	—
RAN	47.14 (14.86)	42.96 51.32	46.38 (13.5)	41.74 51.02	52.6 (15.4)	47.96 57.24	$F_{(2, 125)} = 2.1, p = .12$	—	—
Morphology (%)	50.43 (14.9)	45.7 55.1	57.7 (16)	52.59 62.9	61.21 (18.4)	56.01 66.41	$F_{(2, 125)} = 4.95^{**}$.07	H > L**
Vocabulary (%)	46.73 (14.3)	42.14 51.32	54.15 (15.5)	49.13 59.18	60.16 (18.5)	55.08 66.25	$F_{(2, 125)} = 7.64^{***}$.11	H > L***
Syntax (%)	64.53 (11.8)	60.68 68.39	64.68 (13.1)	60.69 68.69	71.49 (13.4)	67.39 75.6	$F_{(2, 125)} = 3.78^*$.03	H>M*, H>L*
Listening comprehension (%)	47.44 (17.3)	42.11 52.78	57.5 (18.2)	51.97 63.03	58.97 (17.2)	53.37 64.57	$F_{(2, 125)} = 5.26^{**}$.08	H>L*, M > L*
Reading skills									
Words reading accuracy (%)	61.8 (28.6)	53.29 70.29	69.73 (29.1)	60.29 79.19	69.76 (30.7)	60.44 79.09	$F_{(2, 125)} = 1.7, p = .16$	—	—
Words reading fluency	8.13 (7.8)	5.33 10.92	11.77 (10.6)	8.66 14.88	11.4 (11)	8.34 14.47	$F_{(2, 125)} = 1.87, p = .16$	—	—

Table 3. (Continued)

	Low SES (n=48)		Medium SES (n=40)		High SES (n=39)		Significance	Partial Eta Squared	Differences
	Mean (SD)	95%CI Lower Upper	Mean (SD)	95%CI Lower Upper	Mean (SD)	95%CI Lower Upper			
Pseudowords reading accuracy (%)	55.62 (33.8)	45.88 65.37	63.72 (33.4)	52.9 74.5	68.08 (35)	57.26 78.89	$F_{(2, 125)} = 1.5, p = .23$	—	—
Pseudowords reading fluency	7.25 (6.7)	5.07 9.43	9.06 (8.4)	6.64 11.49	9.88 (8.4)	7.49 12.28	$F_{(2, 125)} = 1.38, p = .26$	—	—
Spelling (%)	60.55 (30.4)	51.92 69.18	66.56 (30.1)	57.11 76.01	66.66 (30.1)	57.09 76.24	$F_{(2, 125)} = .60, p = .55$	—	—
Orthographic choice (%)	69.5 (14.2)	65.01 74.06	70.5 (15.7)	65.81 75.19	71.98 (14.9)	67.24 76.74	$F_{(2, 125)} = .28, p = .76$	—	—
Reading comprehension (%)	62.3 (18)	56.7 67.94	65.7 (18.7)	59.8 71.6	66.47 (19)	60.58 72.37	$F_{(2, 125)} = .58, p = .56$	—	—

* $p < .05$.** $p < .01$.** $p < .0$.

of our knowledge, this is the first study to address this question using a standardized norm-based battery of tests among readers of Arabic (Asadi et al., 2014, 2017). In addition, to create a more precise SES index that considers the demographic characteristics of Israel, two additional parameters beyond the commonly used variables of parental education and family income were included in the classification of the chief scientist into SES strata: peripherality of school and migration. Two research questions were outlined for the current research. (1) What are the relations between SES, linguistic skills, and reading ability at the end of first grade among readers of Arabic? (2) Do low SES children differ from medium and high SES children in linguistic skills and reading abilities at the end of first grade?

The examination of both questions resulted in a clear distinction between two groups of skills: the first are the components of reading (decoding, word reading, reading comprehension, and orthographic knowledge) as well as PA and RAN, and the second includes the other language skills: vocabulary, morphological awareness, syntactic knowledge and listening comprehension. In line with the study's hypotheses, significant correlations were found between SES and each of the skills included in the second group. Significant differences between the three SES groups were also observed in performance in each of these skills. In contrast, SES did not correlate with any of the reading components, PA or RAN, and no significant differences between the SES groups were observed with regard to these components and skills. These results provide support to the assumption, that at the beginning of formal reading instruction, SES-related differences would be evident for skills which heavily rely on prior knowledge or language experience, including vocabulary, morphological and syntactic knowledge as well as listening comprehension. However, for the skills which are acquired mainly in the course of the first grade, including reading, orthographic knowledge and PA (i.e., given the reciprocal relations between PA and reading acquisition; Ziegler & Goswami, 2005) – SES-related gaps may have not yet been established. Thus, the current findings suggest a more equal start in these measures for children of various SES backgrounds. At the same time, the existing literature suggests that this, unfortunately, does not persist after the first grade (Pace et al., 2017; Saiegh-Haddad, Shahbani-Kassem & Schiff, 2020), possibly as language comprehension receives a more prominent role in explaining the variance in reading, as would be predicted by the Simple View of Reading (Gough & Tunmer, 1986; Hoover & Gough, 1990)

While decoding, word reading and orthographic knowledge are systematically taught in the course of the first grade, PA and RAN are skills which are often tested in kindergarten as possible predictors of the quality of later developing reading (and of writing) skills. The question arises then, why PA and RAN were distinct in their relations to SES from the oral language skills, which can also be tested in kindergarten as predictors of reading acquisition. There are, however differences in the stimuli and level of difficulty of PA and RAN tasks when administered before and after reading instruction has begun. In our examination, the measures of PA included a phonological manipulation at the level of phonemes, while participants had to relate to phonemes in different position within words. Such demands address a higher level of PA, compared to the level which is commonly examined in kindergarten age. RAN included the naming of alphanumeric stimuli, in addition to the naming of symbols (which is the more common measure used at kindergarten age). The classification of PA and RAN with the reading and writing measures may then be explained by the fact that phonemic awareness has been found to develop hand in hand with the beginning of reading acquisition (Bentin & Leshem, 1993;

Share, 1995), and that automaticity in recognizing alphanumeric stimuli is also expected to grow when these symbols are formally taught.

Notably, while the current results are in line with results by Fung and Chung (2020) and Raag et al. (2011), which suggest that reading instruction reduces priori SES-related differences in PA, the present findings are somewhat different from results reported by Hassunah-Arafat et al. (2017). In their study, significant, albeit weak, relations were found between SES and PA at first grade. This discrepancy may be explained by the differences in the PA measures used in the different studies – while Hassunah-Arafat et al. (2017) administered a task of phoneme isolation, which is commonly used in kindergarten children, in the current study we used phoneme segmentation and deletion tasks. Fung and Chung (2020) also measured PA using deletion tasks, and Raag et al. (2011) administered deletion tasks, segmentation as well as blending and rhyming. The rationale that guided the current study in choosing phoneme segmentation and deletion tasks was that the isolation task might reach a ceiling effect in first grade (Mansour-Adwan, Asadi & Khateb, 2020). The phoneme segmentation and deletion tasks are perceived to be more demanding because they require a number of phonological mental operations (De Graaff, Hasselman, Bosman & Verhoeven, 2008). For example, in the deletion task children are required to (1) isolate the chosen phoneme, (2) delete, and (3) pronounce the word without the deleted phoneme. The use of a comprehensive and age-appropriate examination of PA using a standardized norm-based test battery, as was applied in the present study, may provide a more sensitive evaluation of the PA skills of the participants in the first grade.

In terms of reading acquisition, despite the diglossia characterizing the Arabic language, and the advantage of high SES children in terms of vocabulary, morphology, and syntax, which replicates findings from previous research (Saiegh-Haddad, 2003, 2004, 2007), we found no significant SES-related differences in the reading components. This finding aligns with Noble et al. (2006), who found no interaction between SES and reading development at the end of first grade, providing, however, that PA is intact. At the same time, our results are somewhat different from Fung and Chung (2020), who tested kindergarten children in Hong-Kong at different stages of formal reading and writing instruction. Differences between high and low SES children in word reading and word spelling were obtained at two time points. However, these differences appear to have been reduced (especially in the case of word reading) between the two testing points, i.e., as children gained more experience in literacy skills.

Interestingly, despite significant SES-related differences in listening comprehension, we found no significant differences in reading comprehension. It is important to note that listening comprehension was measured in the literary form of the Arabic language and therefore the only exception was the modality – auditory versus visual comprehension (Kintsch, 1988). Following the simple view of reading (Gough & Tunmer, 1986; Hoover & Gough, 1990), which posits that reading comprehension is explainable mainly by the product of decoding abilities and listening comprehension and neither is sufficient alone, several researchers have argued that the contribution of the decoding component to reading comprehension is stronger in younger children and tends to decrease as readers grow older (Duke, Pressley & Hilden, 2004; Garcia & Cain, 2014; Vellutino, Vellutino, Tunmer, Jaccard & Chen, 2007), whereas the contribution of listening comprehension tends to increase with the age of the reader (Chen & Vellutino, 1997). While novice readers already possess a certain level of verbal or linguistic knowledge, what sets them apart is the rate of decoding acquisition. Given that reading developed evenly across our SES groups, and that at this point reading comprehension probably still relied mainly on

decoding, it may not be surprising that reading comprehension was evenly distributed among SES groups.

While considering the generalizability of the current results, the special characteristics of the Arabic language have to be considered. Namely, in contrast to other orthographies, the duality of the Arabic language (e.g., diglossia) may reflect inherent SES differences. That is, while low-SES children are rarely exposed to the literary form of the Arabic language, children from a high literacy environment enter school with richer prior knowledge of the literary language components and their starting point for acquiring reading is much higher than that of children from less privileged backgrounds (Hassunah-Arafat et al., 2017). In this sense, the findings may suggest that the extent to which the child is familiarized with the literary language may reflect the SES in which the child was raised. Accordingly, significant SES-related differences emerged in vocabulary, syntax, morphology, and listening comprehension. Nevertheless, despite the special characteristics of the Arabic language, which may stress SES-related differences in language skills, the present results are consistent with previous studies exploring other languages (Fernald et al., 2013; Hart & Risley, 2003; Schiff & Lotem, 2011; Schiff & Ravid, 2012). Together, these results add to the growing body of research, such as the work of Levine et al. (2020), which raised the possibility that the SES gap goes beyond the known vocabulary gap and affects syntax and language processing as well.

Limitations of the study

Although an effort has been made to calculate a reliable measure of SES that relies on two additional parameters beyond the commonly accepted variables of parental education and family income variables, it is reasonable to assume that not all relevant aspects affecting individual resources have been considered. We did not have a preliminary assumption regarding the possible involvement of confounding variables such as multilingualism, number of siblings, and home literacy environment. Accordingly, these were not investigated, and therefore their involvement cannot be ruled out. One additional shortcoming of this study is that it presents data from one time point. Thus, longitudinal studies from kindergarten to first grade are necessary in order to test the claim made by previous researchers (Fung & Chung, 2020; Raag et al., 2011) that reading instruction may reduce a priori SES-related differences in language development. Furthermore, a broader sample of K-12 grades may contribute to a better understanding of the relationship between SES, language and reading skills across development. An additional limitation is the rather low reliability of the syntax measure. Syntactic knowledge was the only domain tested with only one task. Nonetheless, the dichotomic nature of this task may explain the low reliability.

Conclusion

To conclude, our study of children in the first grade showed that while significant SES-related differences were found in vocabulary, syntax, morphology, and listening comprehension skills, no evidence of SES-related differences could be located in PA and RAN or in any of the reading components. These results suggest a distinction at this stage between the two groups of language skills, as far as their relation with SES is concerned. Our results were obtained in a representative sample of Arabic-speaking children, while standardized norm-based tests were applied. Despite the special characteristics of

diglossia of the Arabic language, which may stress SES-related differences when the written language is acquired, the current results align to a considerable degree with previous results from studies examining reading acquisition in other languages and orthographies.

Conflict of Interest

The authors declare that they have no conflict of interest.

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