Reading Development among Swedish Children: The Importance of Contextual Resources and Language Ability

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Abstract: Language abilities in preschool years, including those measured with letter knowledge, are predictors of reading development in later school years. The aim of this study was to investigate variation in children’s language abilities before they started school in relation to gender and neighborhood level socioeconomic status (SES). Schools from three municipalities with varied resources and living conditions participated in this study. The participants were 231 children 4–6 years old (girls n = 117, boys n = 114; mean age 4.8 years old; SD = 6 months). In this cross-sectional study, children took the Rapid Automatized Naming (RAN) object test and a Letter Knowledge task. Results showed no significant differences in task performance between boys and girls. Children attending preschools situated in average to above average SES areas had higher scores on the RAN object task compared to those who attended preschools located in low SES neighborhoods. Finally, a significant association was found between children's first language and SES. The implications of these results are explored in this article.

Subjects: Educational Research; Theories of Learning; Childhood

ABOUT THE AUTHOR

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PUBLIC INTEREST STATEMENT

The language abilities of young children are important for their later school achievement and in particular for reading skills. At school age, girls on average are often outperforming boys in reading tests. In this study, we investigated the differences in language abilities in a group of 231 children attending preschool in Sweden, in relation to gender and neighbourhod level of socioeconomic status. At this age, we found no significant differences between boys and girls, but we found that children attending preschool in areas with better socio-economic status had higher performance in language knowledge. Children that were not speaking the majority language at home also attended preschool in an area that had lower average socio-economic status. Based on these results, we recommend in preschool more resources to scaffold and stimulate language development especially among children who attend school in an area with fewer economic resources; and we recommend that, in elementary school, reading methods should be applied that are equally supporting boys’ and girls’ reading skills.
| KEYWORDS: Preschoolers; RAN; Gender; SES; Language skills; Letter Knowledge

1. Introduction

1.1. Background knowledge

Important indicators of linguistic and reading development include phonological awareness, letter knowledge, and rapid naming (RAN; Chall, 1996; Denckla & Rudel, 1976; Lundberg et al., 1988; Manu et al., 2020). Being able to name letters in the alphabet is known to play an important role in the first phase of reading development (Siegel, 2013). Indeed, Chall (1996, p. 149) stated, “knowing the names of the letters before learning to read helps a child in the beginning stages of learning to read, whether he [the child] learns from an approach emphasizing code or meaning”. Early linguistic stimulation in phonological awareness, such as listening to sounds in linguistic games, promotes children’s language development (Lundberg et al., 1988). A good example is the Bornholm model, which originated from a research study conducted in the 1980s (Lundberg et al., 1988). This study showed that structured training of phonological awareness was associated with improvements in children’s early literacy development.

Another important indicator of linguistic and reading development is the ability to rapidly name objects, which can be measured by the Rapid Automatized Naming (RAN) object test (Denckla & Rudel, 1976). In this test, the child is asked to name a series of familiar objects as quickly as possible, while the time taken to do so is measured. Being able to retrieve knowledge from long-term memory and make use of it is vital for good performance in the RAN object test; this ability is key to several aspects of knowledge development. If the process takes too long, learning in subjects such as mathematics and literacy (as well as learning in general) may be hampered (Dehn, 2008; Snowling & Hulme, 2007).

Several studies have reported that scores on the RAN object test are related to later reading development (Liu & Georgiou, 2017; Olofsson, 2000; Scarborough, 1998; Wolff, 2014). In other words, a pupil who is easily able to retrieve the name of objects from memory (a high RAN score) will also be able to retrieve and use earlier stored knowledge. However, pupils who have problems with rapid naming may benefit from specific working memory training, as this type of training has been connected with improvements in reading development (Dahlin, 2011). A study by Lervåg et al. (2009) demonstrated that RAN is a good marker for word reading in the early school years.

Longitudinal studies have also indicated that RAN is an important predictor of reading ability in the later school years (Norton & Wolf, 2012; Wolff, 2014). For example, a Finnish study by Puolakanaho et al. (2007) reported that letter naming, RAN, and phonological awareness from the age of 3.5 years old were good predictors of later reading difficulties. Another longitudinal study in Finland reported that RAN could be regarded as an important component in predicting potential dyslexia (Torppa et al., 2010). Ávall et al. (2019) investigated how RAN scores improved (i.e., faster responses) during childhood in a Swedish sample as children aged. Individual differences in RAN were stable over time; the most rapid growth of mean performance occurred between the ages of four and six years old. For example, children who were identified as having dyslexia at the end of Grade 2 had taken a long time to name objects in the RAN test at the age of 3.5 years old (Torppa et al., 2010). Furthermore, a three-year longitudinal study of 233 Norwegian children by Lervåg et al. (2009) found that RAN was able to predict progress in early reading development even before reading instruction had begun. In the same vein, research conducted in Sweden has shown a strong correlation between RAN scores and reading speed, including a strong relationship between rapid naming and early reading development among nine-year-olds (Wolff, 2014).

It is thus clear that RAN is a good predictor to identify children who are at risk for reading difficulties later in school and need support in vocabulary development. According to Rekha and Indurkhya (2018), RAN is also a good predictor for identifying dyslexia among bilingual pupils. Hulme and
Snowling (2009) reported that the younger the children, the easier the implicit tests are to use. These tests can be used in cases where language ability is not optimal; for example, with children who change language, or when it is suspected that low proficiency in their first language is causing problems. Thus, across several studies, the findings indicate a likely association between RAN and basic abilities in reading and thereby more general learning, which is valid even for children with other language backgrounds who are typically present in preschools (Neass Hjeltland et al., 2020).

1.2. Knowledge Gaps
Many factors may be related to children’s academic performance and development. Key factors include linguistic stimulation in the early years (Kjeldsen et al., 2014; Myrberg, 2000; National Institute for Literacy, 2008), area of residence, home environment (Hart & Risley, 1995; Snow et al., 1998), first language, multilingualism (Lubińska, 2016), teacher input (Hattie, 2009), and biological/social differences (Lyytinen et al., 2015; Özturk et al., 2016; Sahlberg, 2011; Wilsenach & Makaure, 2018). Three factors related to reading development will be discussed in this article: Gender, contextual resources, and language ability as indexed by the Letter Knowledge test and the RAN object test. In the present study, the aims were to describe a group of children’s language skills that are considered preparatory in learning to master written language, what subgroups may be important in this regard, and how development may vary across children’s subgroups.

2. Potential Moderators: Gender, Contextual Resources, and Language Ability

2.1. Reading Development and Gender
There is some evidence of gender differences in language skills, particularly reading comprehension, among Swedish pupils in Grades four and nine, for example, in PIRLS 2016 (Mullis et al., 2017) and PISA (2015). Some studies have also demonstrated that girls perform better than boys on several variables related to reading and other school subjects in these grades (SOU, 2010a:51, 2010a:99). Less research on gender differences in literacy have been conducted on younger children, for example, four-six-year-olds. At this age, formal and more intense instruction in reading has not yet begun.

Understanding the possible importance of gender for reading skills may be important for determining effective reading instruction approaches that are better tailored to learners. For instance, some research studies have found that a phonological approach to letter-sound correspondence benefits boys more than girls when learning to read (Logan & Johnston, 2010; Olofsson, 2000). Differences between school-aged boys and girls in literacy skills have been observed in international studies such as PIRLS 2016 (Mullis et al., 2017). The Swedish results on PIRLS 2016 demonstrated that girls are more likely than boys to reach the highest levels in reading comprehension tests; the difference in scores between boys and girls was approximately 10%. In the national literacy assessments, the girls’ average scores were higher than those of their male counterparts (SNAE, 2018). Studies in Sweden have reported poor decoding skills among boys in Grade three; however, they appear to have performed better in reading comprehension and passed the National Assessment tests in Grade three, which may be a result of the low difficulty level of the tests (Herkner, 2011; Herkner et al., 2014). In these studies, it was also noted that in the primary years and throughout elementary school, the differences between boys and girls in decoding as well as reading comprehension remained.

There are possible developmental and pedagogical explanations regarding the differences in academic achievements between boys and girls (SOU, 2010a:51, 2010a:99). Boys generally mature later than girls; for many of them, this may mean difficulties in coping with the expectations they encounter in school (Allodi Westling, 2010; Ingvar, 2010). Therefore, differences in maturation, emotional control, and knowledge development can partly explain why reading problems are more common among boys than girls. According to Ingvar (2010), teachers are required to be observant at an early stage so boys do not lag behind in their reading development from the beginning.
From a pedagogical perspective, research has revealed that boys can be at a disadvantage in emergent literacy skills when the teaching methods being applied are less effective (Marcon, 1999). This may have a detrimental effect on the process of learning and development and thus set the stage for negative long-term consequences. These negative consequences may further be exacerbated by teachers having lower expectations of boys (SOU, 2010a:99). In summary, it is important to watch for possible negative developments in language skills and early literacy in preschool and to take corrective measures quickly and efficiently.

2.2. Reading Development and Contextual Resources

Another factor that plays a major part in pupils’ education is socioeconomic status (SES). According to the Swedish National Agency for Education (SNAE, 2018), SES co-varies with lower formal education. Almost all children in Sweden attend preschool; “equal opportunity” is both a key value and a general goal within the Swedish school system. Considering that there are obvious socioeconomic differences between municipalities regarding children’s academic achievements (Hart & Risley, 1995), questions can be raised as to whether preschool attendance is enough to compensate for differences in the children’s immediate environment with respect to their language development.

Growing up in a disadvantaged area with a low SES has proved to be a risk factor related to children’s language development (Snow et al., 1998). Hart and Risley (1995) reported that children who grew up in a home with higher SES received more linguistic stimulation, through conversations and parents’ reading aloud, compared to children growing up in a lower SES environment. Some studies have shown an association between parents’ educational level and children’s language development (Hart & Risley, 1995; Niemi et al., 2011). Reading and communicating with young children is important—“the sooner the better” (Niklas et al., 2016).

According to the SNAE (2018), background factors such as parents’ education and income are correlated with children’s marks in the higher grades of elementary school. In addition, Swedish research has revealed that not only parents’ level of education but also whether they receive supplementary social benefits was important to children’s scores (Björklund et al., 2010; Skolverket, 2018). Little research has connected neighborhood level SES indicators to children’s reading development. Therefore, in this study, a contextual SES indicator was utilized, namely the annual household income of all residents living in the postal code in which the children’s preschools were located (registry data at the postal code level). Based on previous research on individual level SES indicators, we expected to observe a positive association between preschool postal code SES and language development. Although we expected that neighborhood level SES could be important to reading development, this would not mean that the negative impact of low SES is inevitable. It is possible to hypothesize that early interventions and effective pedagogy could compensate for these possible effects.

2.3. Reading Development and Language Skills

Yet another important possible factor in children’s development of language skills is the ability to master more than one language, that is, bilingualism or multilingualism. In this context, bilingualism means the ability to switch between two languages. According to Lubińska (2016), the actual situation and how well the child masters each language will decide which language is used at a particular time. Children who grow up in a home in which two languages are spoken may benefit in terms of continued development of their first language while using their second language and learning a third (Gunnerud et al., 2020).

It has also been shown that support from the social environment promotes children’s academic success regardless of their language situation (Lubińska, 2016). Białystok (2007) reported that children are able to transfer their linguistic knowledge from one language to another. These views concur with those presented by Cook (2001), who stated that a pupil’s first language (L1) should be used in parallel with the second language (L2) in the classroom. Dylman and Kikutani (2018) pointed out that different structures in reading systems require different cognitive processes in reading. Kormi-Nouri and Jalali-Moghadam (2015) showed that similarity or dissimilarity between
two languages has an impact on how well one will benefit or whether one will experience difficulties learning a new language.

Research has indicated that a pupil’s first language does not hinder the learning of a second language (Cummins, 2007; Derakhshan & Karimi, 2015). Furthermore, Bialystok et al. (2005) suggested that progress in learning to read in a language other than one’s native language is dependent on the type of writing system used in the respective languages and the depth of orthography. The Finnish language, for example, has a very clear letter-sound correspondence, while the English language is more complicated in its letter-sound structure. A study by Aro et al. (1999) noted that English children in Grade one had more problems to read than Finnish children have in Grade one. As is the case in learning a first language, SES, along with the quality of communication with others, can be important to the success of a child’s second language learning. Little research to date has examined variability in language ability and the possibility of differences in reading skills such as letter knowledge and rapid naming in young Swedish children, and the present study begins to address this question.

3. The Present Study
Considering the possible moderation of reading development by gender, contextual resources, and language ability, we examined whether these moderators were important to reading skills, as indexed by letter knowledge and RAN tests, in a sample of Swedish children. In Swedish studies, there is evidence in later childhood that some boys, relative to girls, maybe at a disadvantage in some aspects of reading (Mullis et al., 2017; PISA, 2015), and it is important to understand if such differences are present in early childhood, so that effective reading instruction approaches can be tailored to support diverse learners (see RQ1). Other key moderators of reading development have also been identified in terms of children’s access to resources within their home environment, with family SES in some cases being inversely associated with reading development (Hart & Risley, 1995; Snow et al., 1998). A neighborhood level SES indicator has rarely been examined in relation to indicators of children’s reading development, and this study fills this gap by testing this association (see RQ2 and RQ4). Finally, also adding novelty to the existing research literature, this study sought to examine if there was an association between different indicators of young children’s language ability and reading development. Given that few studies have been conducted on these subject areas with a contemporary sample of Swedish children, the present study was viewed as exploratory and associations between reading development and the moderators were investigated as research questions rather than directional hypotheses.

4. Research Questions

4.1. Research Question 1
Did boys and girls significantly differ in their scores in the RAN object and Letter Task tests?

4.2. Research Question 2
Did children attending schools in postal codes with below, average, or above average income significantly differ in their scores in the RAN object and Letter Task tests?

4.3. Research Question 3
Did children with Swedish as their first language, compared to children with another first language, significantly differ in their scores in the RAN object and Letter Task tests?

4.4. Research Question 4
Was there an association between children’s first language and school’s postal code income?
5. Method

5.1. Participants
A total of 26 preschools located in three municipalities with different social composition and housing in a large Swedish metropolitan area participated in this study. An average of 16 children per school took part in the study. A total of 231 children took part in this study (girls n = 117, boys n = 114) age M = 4.8 years old, SD = six months. In the analyses, the number of participants varies from 197 to 266 (see the tables for more details).

5.2. Measures
Two tasks were used to measure reading development in terms of linguistic competence: the RAN object (Denckla & Rudel, 1976) and the Letter Task (Johansson, 2009), while a teacher questionnaire provided the children’s demographic information. Registry data were used to determine the household income of residents residing in the postal code in which the children’s schools were located (Hedlund, 2020; Statistics Sweden, 2018).

5.3. Rapid Automatized Naming: Child Task
The RAN test was administered (Denckla & Rudel, 1976). The task was to name familiar objects as quickly as possible. The test was performed individually in a separate room and the assessor noted the time (in seconds) it took for the child to name objects that were familiar (e.g., umbrella, apple, hammer, bicycle, horse). Pictures of the objects were presented in a mixed sequence on a 21 × 30 cm sheet of paper consisting of four rows with four objects on each row. The number of correct (RAN Time) and incorrect answers (RAN Error) was noted.

5.4. Letter Knowledge Task: Child Task
In the Letter Knowledge test (Johansson, 2009), children are asked to read out loud the name of the letters. The uppercase letters were organized with five letters each on five rows, with two on the sixth row, on a 21 × 30 cm sheet of paper printed with Times New Roman font. The letters Q and W were not included, as they are very uncommon in the Swedish language (mostly used in names). Three additional letters are included, Å, Ä, and Ö, representing three separate phonemes (vowels), which are common in Swedish and thus are included in the Swedish version. The maximum Letter Task score possible is 27. The number of incorrect responses was also noted, as well as time taken on the task. The test was performed individually in a separate room.

5.5. Child Demographics: Teacher Questionnaire
A questionnaire was administered to the children’s teachers, providing information about each child’s language background; that is, whether the child’s first language was Swedish or another language. In this sample, 57.5% (n = 149) of the children had Swedish only as their first language, or Swedish and another language as their first languages; 18.8% (n = 48) of the children had a language other than Swedish as their first language, and 23.7% of participants were missing data about their first language.

5.6. School Postal Code Income: Registry Data
In order to capture the socioeconomic characteristics at the neighborhood level in regards to the schools in which children attended, we utilized available income collected from Statistics Sweden to create a categorical index of annual household income of all residents living in the postal codes in which the children’s schools were located. The registry data were collected for the approximate years when child level data collection took place. The schools which the children attended were categorized by the annual average household income of residents in the postal code in which each school was located. The sample average across all schools was used as a cutoff to determine if the income of residents (i.e., by postal code) was below (coded 1) or above (coded 2) the sample average, which was 699,508 Swedish Crowns (SEK) (SD = 342,574 SEK) across all schools. Information on this variable was missing for one school postal code.
6. Procedure

Three municipalities in a metropolitan Swedish area were chosen based on different linguistic and socioeconomic features. Within these participating municipalities, day care centers or preschools were then recruited. One of the requirements for inclusion in the study was that the school should not be an open or cooperative-administered preschool or a family day home. Analyses for this study are based on the pre-test of an intervention trial. In the intervention trial, schools were randomly assigned to an immediate intervention or a one-year waiting-list control condition. The study took place over the course of two years in two data collection waves (124 children in Wave 1 and 142 children in Wave 2).

The study inclusion criteria at the child level were children ranging from four to six years old whose parents/guardians had provided consent for their participation in the study. Among those that met the study inclusion criteria, a random selection of children was then chosen for study participation. The selected children were also asked to agree to participate in the study. The sampling method was used to reduce the burden on teachers who, in another part of the wider study, had been asked to report on the participating children’s social and emotional competence on two occasions (pre- and post-test). The child tasks/measures focused on in this paper are part of a wider assessment battery that was administered at the children's schools by trained research assistants.

6.1. Data Analysis Plan

All analyses were performed using SPSS 22. Research questions one to three were examined with three MANOVAs using gender, school postal code income, and the child’s first language as fixed factors and RAN indices and Letter Task as dependent variables. Research question 4 was tested with one Pearson Chi-Square analysis due to the two categorical variables in this analysis.

7. Results

7.1. Preliminary Analyses: Outliers, Normality, and Missing

The preliminary analyses focused on outliers and normality in the main study constructs (i.e., the two RAN indices and Letter Task). The means and standard deviations for the children's RAN object and Letter Task scores are reported in Table 1. Outliers were identified using individual leverage statistics; four times greater than the mean leverage value was used as the cutoff to determine outliers, of which eight were found. Kurtosis and skewness values in the main study constructs changed with and without the presence of the outliers. Without outliers, RAN and Letter Task had no skewness or kurtosis value above an absolute value of 2; conversely, when outliers were included, the two RAN indices were non-normal (skewness = 3.8, 3.9 and kurtosis = 26.4, 34.1). The analyses related to the main hypothesis were conducted with and without the presence of outliers. Main results were generally consistent both with and without outliers. Because the removal of outliers related to normality, the results section describes the results conducted with outliers removed from the analysis.

| Table 1. Means and standard deviations for the main study constructs: RAN object (Time, Error) Letter Task |
|---------------------------------------------------------------|
| Constructs | N | Min | Max | M   | SD |
|-------------|---|-----|-----|-----|----|
| RAN_Time    | 266 | 0.00 | 118 | 30.28 | 8.99 |
| RAN_Error   | 266 | 0   | 11  | .69  | 1.14 |
| Letter Task | 266 | 0   | 29  | 8.25 | 8.82 |
A univariate missing values analysis indicated 2.6–4.9 % missing on the two RAN indices and the Letter Task. Six children had missing data on RAN and the Letter Task, while 11 children had either missing data on the Letter Task or RAN Error. Data were not missing completely at random (Little’s MCAR test: \( X^2 = 20.75, df = 5, p = .001 \)). Missing data were analyzed with the use of dummy variables for missing or present data in the RAN and Letter Knowledge indices and then correlated with the demographics. With one exception, no significant correlations (p < .05) were found between missing data on RAN object and Letter Knowledge tests and children’s gender or first language, municipality, and school. The exception was for missing data on the Letter Knowledge task, which was significantly related to the school unit (r = -.17, p = .005). Missing values were imputed with expectation-maximization method in SPSS. Finally, in order to determine if it was acceptable to combine children’s RAN and Letter Task scores across the study waves, a MANOVA was conducted for the RAN and Letter Task scores with data collection wave as the fixed factor, and the results were non-significant. Thereby indicating the average scores for children in the two waves, at pre-test, were not significantly different and could therefore be combined.

7.2. Preliminary Analysis: Correlations among Indicators of Reading Development

Pearson’s product moment correlation analysis was used to determine the association between children’s performance on the RAN indices and Letter Task. The results showed that there was a significant positive correlation between the RAN indices—RAN_Time and RAN_Error (r = .20, p = .001), indicating that more time taken to name pictures was associated with more errors in the task. There was also a significant negative correlation between the Letter Task and RAN_Time (r = -.36, p < .001), indicating that the more uppercase letters correctly identified (Letter task), the less time taken for a child to name all the pictures (RAN_Time).

7.3. Research Question Related Analyses

Research question 1: Did boys and girls significantly differ in their scores in the RAN object and Letter Task tests? (MANOVA 1)

To test research question 1, a MANOVA was conducted for the RAN object and Letter task scores with gender as the fixed factor; the result was non-significant (see Table 1 and Table 2).

| Table 2. Means and standard deviations for boys and girls on RAN object Time, RAN Error and Letter Task |
|------------------------------------------------------------------------------------------------|
| **N** | **M** | **SD** |
|-------|-------|-------|
| RAN-Time |       |       |
| Boys   | 117   | 30.6  | 10.69 |
| Girls  | 114   | 29.83 | 7.09  |
| Total  | 231   |       |       |
| RAN Error |      |       |
| Boys   | 117   | .71   | 1.06  |
| Girls  | 114   | .58   | 1.21  |
| Total  | 231   |       |       |
| Letter Task |     |       |
| Boys   | 117   | 8.14  | 8.93  |
| Girls  | 114   | 8.84  | 8.75  |
| Total  | 231   |       |       |

RAN_Time = The number of seconds it took a child to correctly name all pictures; RAN_Error = The number of wrong answers a child gave during the picture task; Letter Task = The number of correctly identified letters (uppercase only).
Table 3. Means and standard deviations for the main study constructs by ran object (sec) and letter task (correctly identified letters, uppercase only)

|                        | School Income Category by Postal Code | M    | SD  | N  |
|------------------------|--------------------------------------|------|-----|----|
| RAN object* sec        | Below sample average income           | 31.28| 10.88| 146|
|                        | At or above sample average income     | 29.00| 5.79 | 111|
|                        | Total                                | 30.30| 9.10 | 257|

| RAN object Error       | Below sample average income           | .70  | 1.10 | 146|
|                        | At or above sample average income     | .72  | 1.23 | 111|
|                        | Total                                | .71  | 1.15 | 257|

| Letter Task* Correctly Identified | Below sample average income           | 6.50 | 7.93 | 146|
|                                  | At or above sample average income     | 10.29| 9.47 | 111|
|                                  | Total                                | 8.14 | 8.81 | 257|

* = according to Bonferroni post hoc analysis (p < .05).

Research question 2: Did children attending schools in postal codes with below average, average, or above average income, significantly differ in their scores in the RAN object and Letter Task tests? (MANOVA 2)

To test research question 2, a MANOVA was conducted for the RAN object and Letter task scores with school postal code income (below or above average, coded 1 and 2, respectively) as the fixed factor. The MANOVA yielded a significant multivariate F (Pillai’s Trace), F (3, 253) = 4.40, p = .005 with significant between subjects effects for the RAN_Time [F (1, 257) = 3.99, p = .047, η² = .015 (small effect size for partial eta squared)] and Letter task scores [F (1, 257) = 12.21, p = .001, η² = .046 (small to medium effect size)]. Relative to children attending schools with a below average resident income, children attending schools with an average or above average resident income took less time to name all pictures in the RAN task (time) and identified more uppercase letters. (See Table 3 for means and standard deviations.)

Research question 3. Did children with Swedish as their first language compared to children with another first language significantly differ in their scores in the RAN object and Letter Task tests? (MANOVA 3)

To test research question 3, a MANOVA was conducted for the RAN object and Letter task scores with the child’s first language as the fixed factor and the results were significant. The MANOVA yielded a significant multivariate F (Pillai's Trace), F (3,193) = 7.76, p < .001, with significant between subjects effects for the RAN object Time [F (1, 197) = 11.51, p = .001, η² = .056 (medium effect size)], RAN_Error [F(1,197) = 4.00, p = .047, η² = .020 (small effect size)], and Letter task scores [F(1,197) = 15.10, p < .001, η² = .072 (medium effect size)]. (See Table 4).

Research question 4. Was there an association between children’s first language and school postal code income? (Chi-Square)

Regarding research question 4, a Pearson Chi-Square X² (1, 203) = 27.41, p < .001 showed a significant association between children’s first language and school postal code income (see
Table 4. Means and standard deviations for the main study constructs by child’s first language

| Language Group | M     | SD    | N  |
|----------------|-------|-------|----|
| RAN_Time*      |       |       |    |
| Language Group 1 | 28.95 | 5.80  | 149|
| Language Group 2 | 32.65 | 8.57  | 48 |
| RAN_Error*     |       |       |    |
| Language Group 1 | .51   | .68   | 149|
| Language Group 2 | .77   | 1.03  | 48 |
| Letter Task*   |       |       |    |
| Language Group 1 | 9.66  | 9.19  | 149|
| Language Group 2 | 4.20  | 5.62  | 48 |

Notes. * = according to univariate F tests in MANOVA (p < .05), children with Swedish as a first language or Swedish plus another language (Language Group 1), took less time and made fewer errors on the RAN task, as well as correctly identified more uppercase letters than children with a first language other than Swedish (Language Group 2). RAN_Time = The number of seconds it took a child to name all pictures; RAN_Error = The number of wrong answers a child gave during the picture task; Letter Task = The number of correctly identified letters (uppercase only).

As can be seen in Table 5, children with a first language that included Swedish and those with a first language other than Swedish were relatively evenly split by school postal code income. Further, among children with a first language other than Swedish, most attended school in a postal code in which residents had a (n = 46) below average income, with a minority of children in this group attending school in a postal code in which residents had an average or above average income (n = 4).

8. Discussion
The main aim of the present study was to explore the reading development, in particular linguistic competence in terms of RAN of objects and letters among children aged 4–6 years old and to examine the possibility of subgroup differences in performance related to gender, neighborhood level SES, and child language ability. Briefly summarized, main results were that boys and girls did not show significant gender differences in reading development (RQ1), and children attending schools with an average or above average resident income took less time to name all pictures in the RAN task (time) and identified more uppercase letters in comparison to children attending schools in communities with below average resident income (RQ2). Furthermore, children with Swedish as a first language or Swedish plus another language, took less time and made fewer errors on the RAN task, as well as correctly identified more uppercase letters than children with a first language other than Swedish (RQ3). Finally, it was found that children with a first language other than Swedish, were likely to attend a school in a postal code in which residents had a below average income (RQ4). The above findings thus indicated that neighborhood level SES and language ability were important to reading development in this sample, and due to the combined findings for RQ3 and RQ4, it may be that these indicators represent other important experiences and conditions not included in this study. These results each in turn and as a whole are examined in the subsequent sections.

Table 5. Association between children’s first language (first language Swedish or Swedish and additional language; first language other than Swedish) and school postal code income

| School income category by postal code | First language Swedish | First language other than Swedish | Total |
|--------------------------------------|------------------------|----------------------------------|-------|
| Below sample average income          | 77                     | 46                               | 123   |
| At or above sample average income    | 76                     | 4                                | 80    |
| Total                                | 153                    | 50                               | 203   |
8.1. Gender and Reading Development
The pupils taking part in the study are much younger than the participants in most of the studies which found gender differences in reading development, referred to earlier in the introduction section, as participants in these studies were around 10 and 15 years old (e.g., Mullis et al., 2017; PISA, 2015). In the present study, no significant differences were found regarding letter knowledge and rapid naming between boys and girls aged 4–6 years. In a Finnish community sample of children that were followed from age six up to age 15 (Manu et al. 2021), gender differences were small at age six, while a gender gap in literacy developed later. Letter Knowledge at six years old, however, was still a predictor of reading scores, especially for boys (Manu et al. 2021). Earlier research in Sweden has demonstrated clear differences between boys and girls in reading skills in Grades 4 and 9 (PISA, 2015). The observed later gender differences in PIRLS and PISA, which differ to the results of the present study can be explained in several ways. First, a large sample of participants, as in PIRLS and PISA, renders stronger statistical power, which means that rather small variations in achievement scores may result in higher significance. In the present study the indicators of reading development were designed for 4–6 year-olds (i.e., preschool, before formal literacy teaching in Sweden) to measure pre-reading skills, whereas the PIRLS and PISA tests were designed for 10 and 15 year-olds, respectively, to measure reading skills.

The results of the present study revealed no significant differences between boys and girls with respect to the RAN and Letter Knowledge tests among 4–6 year-olds. The gender gap seems to surface later on and could be related to early reading instruction. Thompson (1987), and Johnston and Thompson (1989) posited that boys are inclined to use a phonological approach to reading. In other words, boys seem to prefer a letter-sound correspondence rather than a contextual approach when they read. According to some studies, boys’ reading development improved when they learned to read using a method that was focused on synthetic learning, that is, letter-sound correspondence (Johnston & Watson, 2005; Johnston et al., 2009). In order to prevent boys from falling behind in reading development during the first years of schooling, results such as these, together with the results from the present study among 4–6 year-olds, should be taken into consideration, and a synthetic method should be practiced in teaching reading.

Which specific occurrences and experiences between preschool age and Grades 4 and 9, that may explain gender differences in linguistic development, goes beyond the scope of the present study. However, a recommendation could be to adopt instruction methods in primary school that are equally effective for both girls and boys. Furthermore, it is important to raise teachers’ awareness that there is no inherent gender-related reason for girls or boys to be better in reading, and to promote teachers’ active efforts to counteract the language skills gap that may arise between boys and girls during preschool and then at the transition into primary school (Kikas et al., 2016).

8.2. Contextual Resources
One of the research questions concerned how the children’s linguistic competence prior to starting school co-varied with socioeconomic factors on a neighborhood level. The results showed that achievement in letter knowledge and RAN tests among preschoolers differed between residential areas in which preschools were located. This suggests a need for training in systematic language stimulation and competence development for teachers who are working in areas with lower SES at the neighborhood level. The findings for research question 3 are important given that prior research locates SES within families (e.g., Hart & Risley, 1995; Niemi et al., 2011) with a focus on parents’ education and income. This study is consistent with the idea that having greater socioeconomic resources relates to better reading development, but shows this association in a novel way by broadening the view of SES to examine the importance of the immediate environment in which children spend a large part of their day (i.e., the neighborhoods around their schools). Swedish municipalities have the primary responsibility for implementing preschool and formal education for young people. Within municipalities, there are neighborhoods which vary in their contextual resources, which are often not considered but instead are lumped together. Yet these neighborhood level variations can have bearing on the everyday experiences of children, as
indicated by the study results for research questions 3 and 4. Thus, inclusion of a wider view of SES as being located not only in the socio-demographic characteristics of individuals and families, but in contexts of everyday experience, are important to advancing our understanding of children’s reading development.

Especially in preschools situated in communities with less resources, teachers should work with even greater attention to adequately stimulating students’ language development. Teacher in-service training on pedagogy for language development and second language learners might be beneficial in these contexts (OECD, 2010). Multilingual teachers with good competence in Swedish could also provide support to Swedish language learners (SOU, 2020:67). Many reforms for more support of teachers have been advocated, with a particular need to boost the work done in preschools, with continuing education for preschool teachers, so that they better can prepare children for school (OECD, 2010).

8.3. Language Skills
Children who did not have Swedish as a first language had poorer results on the language tests used in the study. They took a significantly longer time to perform the RAN test and made more errors. In addition, they identified about half as many letters correctly on the letter test compared to children with Swedish (or Swedish plus another language) as their first language (see Table 4). It is of vital importance for preschools in areas with many children who are learning a new language to stimulate the children's language development and promote their linguistic knowledge both in their first language and in Swedish.

The advantages of bilingualism in learning to read have been pointed out by Cummins and Gulutsan (1974), who stated that bilingual pupils are creative thinkers who often have a head start in conceptual comprehension compared to monolingual pupils. Cummins also noted that bilingual children may learn additional languages more easily because they are able to think in abstract terms and their metalinguistic competence is more developed, which is a clear advantage in language learning (Cummins, 2007). The possible advantages of bilingualism on executive functions for children were investigated in a systematic review; although group differences were found, these were marginal (Gunnerud et al., 2020). Bilinguals with middle-class backgrounds performed better (Gunnerud et al., 2020). Preschool teachers have important roles to play in their encounters with bilingual children. Parents or caregivers who are aware of the importance of language use spoken language in communication with their children to a great extent, which is beneficial to children whether they are monolingual or bilingual. In conclusion, bilingualism can have a double-edge—in essence, although it has clear positive benefits, the downside is the potential risk that there is an inadequate level of development in the new language.

A recent report from a governmental investigation does not give any specific directions concerning support of native language development in preschools (SOU, 2019:18), but in a proposition issued as early as 1975/76 the government emphasized the importance of prioritizing efforts in the area of language stimulation in preschool, because communication skills are such an important part of personal development (Prop. 1975/76:118). According to Cummins (2007), being in command of one's native language supports learning other languages and should not be regarded as an obstacle in the development of a second language. Moghadam (2015) found in a qualitative study that there are flaws in special needs education for bilingual children, as teachers claim that they have little knowledge about the relationship between reading and writing disabilities and bilingualism.

Regardless of whether pupils are monolingual or bilingual, they will benefit from the suggestions regarding early identification of potential problems and special education interventions that have been proposed in preschool and Grade 1 (SOU, 2016:59). Therefore, in this context, it is essential to identify children who may benefit from additional support, such as those who must switch from their native language to a second language at school, and those who may have a risk of
developing dyslexia or have other speech problems. These children must be given opportunities to receive timely specialized support.

8.4. First language and Contextual Resources

In order to better understand how contextual resources could be important to reading development and the subgroups of children who are more or less likely to attend school in a postal code or neighborhood with more or less economic resources, we explored the association between children’s first language and postal code income (this is the postal code in which children’s schools were located). This research question was posed as a way to unpack part of the hypothesized (and subsequently supported) subgroup differences favoring better reading development in children who attend schools located in areas in which residents have average to above average income, relative to those areas with below average income. Thus, it appears that areas with below average income, in this study, were also the areas in which schools had more children with a language other than Swedish as a first language. Notably, in line with these findings, there are recent policy initiatives that aim to address and bring more resources into preschool education and support to teachers’ competence development and support for their education around bilingualism (SOU, 2020: 67).

A preschool teacher who works with systematic linguistic training and communication is paramount for children who have multiple languages. If preschool teachers are able to identify potential difficulties at an early stage, the prevention of future reading and writing problems will be more likely (Kjeldsen et al., 2014). It is known that children who are read to at home from a young age and who have interacted with adults will have a good chance of developing a rich vocabulary and sufficient linguistic ability (Niklas et al., 2016).

On a practical level, RAN seems to function well as an indicator of a need for early intervention because it can be delivered regardless of linguistic background and, as mentioned earlier, scores on the RAN object test has a high correlation with reading development in the future (Olofsson, 2000; Scarborough, 1998; Wolff, 2014). In this study, socio-economic resources at the neighborhood level and children’s first language were important constructs. These constructs in addition to indicators like preschool climate and resources around language instruction in preschools are promising areas for future research attention, and would lend better insight into the findings of the present study which require replication and expansion.

9. Conclusions and Implications

Linguistic competence is essential, as linguistic and literacy skills play major roles in everyday life. Early support for children is important for later academic achievement as well as life success in general (Fawcett, 2003; Lyon, 2002). Along these lines, this study showed several novel and important findings, such as a lack of gender differences in reading development at this age in this sample, sub group differences in reading development by postal code level income for the schools that children attended, as well as by children’s first language. In order to develop reading comprehension ability, letter knowledge and decoding skills are not enough. Good reading comprehension also requires a rich vocabulary and linguistic as well as conceptual comprehension. The present study implies that there can be differences in children’s linguistic competencies when they begin school. This should be taken into consideration when it comes to the distribution of economic resources and pedagogical content in preschool, especially in schools located in disadvantaged areas with a lower SES and those with children whose first language is other than Swedish. Greater efforts in language development activities are warranted in these preschools.

9.1. Study Limitations and Future Research

There are several limitations to be noted for this study. Namely, this study is cross-sectional and thus causal inference between the study constructs should not be made. The sample represents an urban sample and study results may not generalize to children living in Swedish smaller towns or the countryside. Although these results have wider implications, the results await further confirmation from other studies. However, it is clear even with these limitations that efforts to support
all preschool teachers in their work supporting their students’ reading development are needed. This is particularly the case when there may be fewer economic resources at the neighborhood level and students attending a preschool are more linguistically diverse. Capitalizing on this diversity is important and is not at odds with efforts to support children in their reading development of first and subsequent languages.

In light of the results of the study presented here, the competence level of preschool teachers cannot be overemphasized. Giving bilingual children, attending schools in areas with less economic resources for inhabitants, ample opportunities to develop their language abilities is an opportunity that should not be missed. By employing, for instance, linguistic games and read-aloud sessions, teachers and preschool can possibly support subgroups of children who can benefit from more support. A further look into these areas would provide interesting subjects for future research. The number of bi- or multilingual children in Swedish schools is increasing due to increased immigration in recent years (SNAE, 2015; Statistics Sweden, 2021). As good results in the RAN test appear to be an indicator of success in learning to read in school, it could be a simple tool to establish potential needs among immigrant children for early interventions (Åvall et al., 2019; Wolff, 2014). Gellert and Elbro (2017) have also reported positive results of a dynamic decoding test in preschool as a way to predict potential reading problems in Grade 1, thus preventing future reading disabilities. This could also be an interesting topic for further research.

**Funding**

This study was funded by the Swedish Council for Working Life and Social Research, the Swedish Research Council, Formas, and VINNOVA (dnr: 259-2012-71) as well as by Stiftelsen Clas Groschinsky Minnesfond and Stockholm University’s Centrum for kompetensutveckling inom vård och omsorg. Open access publishing was made possible by Stockholm University.

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**Citation information**

Cite this article as: Reading Development among Swedish Children: The Importance of Contextual Resources and Language Ability, Birgitta Herkner, Mara Westling Allodi, Laura Ferrer Wreder & Lilianne Eninger, Cogent Education (2021), 8: 1940631.

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