

Impact of shared reading and pre-reading skills in the reading learning process

Efecto de la lectura compartida y las habilidades prelectoras en el aprendizaje lector

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Abstract

The work carried out in the last years on the learning of reading has allowed to identify the variables that are most involved in the acquisition of this linguistic ability. It is widely known that phonological knowledge, speed of denomination and reading practices that favor alphabetic knowledge are among the most relevant variables for the achievement of this learning. Nevertheless, there are not many investigations that have been done with the purpose of knowing the existing entails between these skills and the initial learning of the reading. The purpose of this study was to analyze whether learning programs that integrate the development of phonological processing skills, naming speed along with dynamics that favor alphabetic knowledge through shared reading practices, favor the efficiency of the decoder process and acquire a better understanding of reading. A quasi-experimental design was used to compare groups with pretest and posttest measurements. The study involved 402 students aged between 4 and 6 years old. The results weigh the potential value of the program and provide guidance that facilitates the learning process of reading in the early ages.

Resumen

Los trabajos efectuados en los últimos años sobre el aprendizaje de la lectura han permitido identificar las variables que en mayor medida intervienen en la adquisición de esta habilidad lingüística. Actualmente se sabe que el conocimiento fonológico, la velocidad de denominación y las prácticas lectoras que favorecen el conocimiento alfabético se encuentran entre las variables más relevantes para el logro de este aprendizaje. Sin embargo, son escasas las investigaciones que se han realizado con la finalidad de conocer las vinculaciones existentes entre estas habilidades y el aprendizaje inicial de la lectura. El propósito de este trabajo fue analizar si, con programas que integren el desarrollo de las habilidades de conocimiento fonológico, rapidez de denominación junto con dinámicas que favorezcan el conocimiento alfabético a través de prácticas de lectura compartida, se favorece la eficacia del proceso decodificador y se adquiere una mejor comprensión de la lectura. Se empleó un diseño cuasi-experimental de comparación entre grupos con medidas pretest y posttest. En el estudio participaron 402 alumnos con edades comprendidas entre los 5 y 6 años. Los resultados ponderan el valor potencial del programa y se proporcionan orientaciones que facilitan el proceso de aprendizaje de la lectura en las primeras edades.

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Introduction

When readers begin the reading acquisition process in alphabetical systems as Spanish, they must be aware of the direct connection between oral and written language, because the representation system of our language relies on the segmentation of the speech chain, and they must also be aware that letters are graphic symbols that correspond to sound elements, as each letter is associated to one sound unit.

Phonological awareness is the ability to reflect on oral language and to access the explicit knowledge inherent to the sounds of speech. It consists on intentionally identifying, segmenting and combining words (lexical awareness), syllables (syllabic awareness), intrasyllabic units (intrasyllabic awareness) and phonemes (phonemical awareness). As far as all these levels of phonological awareness are concerned (lexical, intrasyllabic and phonemical), there is general agreement that handling minimum word units and the ability to find the sequence of the phonemes they are made up of is the aspect that is more directly linked to learning to read, because the better phonemes of words are identified, the easier it will be to associate sounds and their relevant graphemes (Defior & Serrano, 2011; Gutiérrez & Díez, 2015; Suárez-Coalla, García-de-Castro & Cuetos, 2013). In the past decades, several works have shown the key role played by the phonological awareness skills in the acquisition and development of reading, as well when explaining the difficulties thereof (Arnáiz, Castejón, Ruiz & Guirao, 2002; Bizama, Arancibia & Sáez, 2011; Bradley & Bryant, 1983).

When learning to read, alphabetic knowledge is another important element of the early literacy process, as it makes acquiring the processes of grapheme-phoneme correspondence easier (Diuk & Ferroni, 2012). Certain longitudinal and correlation studies carried out in different languages (De-Jong & Van-der-Leij, 2002; López-Escribano & Beltrán, 2009) have shown that alphabetic knowledge fosters the

development of phonological skills through the establishment of a causal relationship between knowing the name of the letters and learning the sounds.

Nevertheless, reading is not limited to transforming graphic symbols into sounds and, upon associating them, into words. Reading is a far more complex process, the ultimate aim thereof being extracting meaning where decoding is the initial requirement. In other words, in order to learn to read efficiently, it is required to have the necessary resources to decode graphic symbols, and to give them a meaning.

Lexical richness is another factor that has shown significant predictive validity of learning to read (Guarneros & Vega, 2014), shared reading being one of the most influencing means for its development. The first studies on the benefits of shared reading started by linking this type of practices to oral language skills (Chomsky, 1972; Ninio, 1983). Other works have subsequently shown the contributions of shared reading to language development, both in terms of expressive and receptive vocabulary (Borzzone, 2005; Penno, Wilkinson & Moore, 2002). In addition to being one of the most important activities that foster lexical development, this kind of reading may also contribute to acquiring reading because the development of spoken language is strongly related to phonological sensitivity in the early years of children (Storch & Whitehurst, 2002). Therefore, this type of classroom dynamics may be very useful to promoting learning to read. The most recent research enables to verify the benefits of this type of practices, which may rely on the causal chain that makes reading comprehension easier (Goikoetxea & Martínez, 2015).

Rapid automatized naming is another area of concern of the most recent research, which is also related to phonological awareness, as it is seen as a key element of phonological processing that also participates in the acquisition of reading (Gómez-Velázquez, González-Garrido, Zarabozo & Amano, 2010). Some authors believe

that phonological awareness is more strongly related to decoding skills, while rapid automatized naming is more strongly related to reading fluency and spelling (González, Cuetos, Vilar & Uceira, 2015; Suárez-Coalla, García-de-Castro & Cuetos, 2013). Other authors believe phonological awareness is predictive in the earliest stages of reading skills acquisition, while rapid automatized naming is predictive during the development of spelling skills (Kirby, Parrilla & Pfeiffer, 2003). In general terms, rapid automatized naming is highly correlated to the performance in word identification tasks, in reading and comprehension; while the phonological element is more correlated to decoding tasks (González, López, Cuetos & Vilar, 2017; Wolf *et al.*, 2002).

Nevertheless, in spite of the evidences related to seeing phonological knowledge, rapid automatized naming, alphabetic knowledge and shared reading activities as skills that foster learning to read, only a few studies in Spanish analyse the way the combination of these components may also contribute to learning to read successfully.

This study aims at analysing if reading skills are improved through learning programmes that include shared reading practices combined with the implementation of phonological knowledge skills and the stimulation of rapid automatized naming.

Methodology

Participants

In order to select the sample, different public and state-subsidised schools of a middle socio-cultural level were selected and divided into two groups: one group where the intervention programme was to be voluntarily applied (experimental group) and another group where the programme would not be applied (control group). 402 students, aged between 4 and 6 years old, participated in this study ($M = 5.46$, $DT = 0.38$), of whom 49.3% were boys and 50.7%

were girls. 206 participants were assigned to the experimental group and the other students were assigned to the control group (196). As far as the 206 participants of the experimental group are concerned, 48.4% were boys and 51.6% were girls, while 48.2% of the 196 participants of the control group were boys and 51.8% were girls. From a statistical point of view, the contingency analysis (Pearson's chi-squared test) between status and sex did not show any significant difference ($X^2=0.51$, $p > .05$).

Assessment instruments

In order to assess the dependent variables under study, four assessment instruments with psychometric guarantees in terms of reliability and validity were used.

Phonological Knowledge Assessment Test (PECO, as per its Spanish acronym) (Ramos & Cuadrado, 2006). This test assesses two levels of phonological knowledge (syllabic and phonemic), each one made up of three different tasks: identification, addition and omission. Additionally, it takes into account the position of the syllable or the phoneme being worked on: at the beginning, in the middle or at the end of the word. This test includes three subtests with syllables and phonemes (identification, addition and omission tasks), with a total of 30 items (15 syllables and 15 phonemes). The highest score is 30; each correct answer scores 1 point and each wrong answer scores 0 points. Reliability, calculated using Cronbach's alpha, is .80.

Introduction to reading set (BIL, as per its Spanish acronym). The introduction to reading set created by Sellés, Martínez, Vidal-Abarca & Gilabert (2008) was used in order to assess the skills that make access to reading easier. In particular, the following subtests were performed: recognition of words, recognition of sentences, functions of reading and naming the letters. In these tests, each correct answer scores one point. These subtests have a Cronbach's reliability coefficient of 0.78.

Rapid automatized naming. The technique called RAN created by Denckla & Rudel (1976) and Wolf & Denckla (2005) was adapted for this purpose. This test is made up of three tasks: series of colours (primary and secondary), series of familiar drawings and series of letters (frequent invariant vowels and consonants). Each task is made up of 36 stimuli, divided into 4 rows with 9 elements each one. In each task, the stimuli must be named from left to right as fast as possible. Response times of each task and the number of mistakes made are recorded in a record sheet.

Assessment of the reading processes. Four subtests of the PROLEC-R test (Cuetos, Rodríguez, Ruano & Arribas, 2007) were used to assess reading. Words and pseudowords were read to assess the lexical processes and the subtests of grammatical structures and sentence comprehension were used to assess the semantic processes. To obtain the final score of each one of these four tests, each correct answer scores 1 point, and the time spent on the first two questions is also taken into account. This test has a Cronbach's reliability coefficient of 0.79.

Design & procedure

This study used a quasi-experimental design of pretest-posttest repeated measures with a control group. A set of four assessment instruments was applied to the participants of both the experimental and control group before and after implementing the intervention programme in order to measure the dependent variables on which it was hypothesised that the programme would have an impact on: phonological awareness, reading support skills, processes involved when learning to read and rapid automatized naming. This set of tests before and after implementing the programme was applied by educational professionals (specialist teachers in Speech and Hearing and educational psychologists) who had been previously trained, which made collecting homogeneous data easier.

The students' initial assessment was performed individually in spaces close to the classroom in September during class hours. The intervention programme was then implemented in the experimental groups (4 sessions of 50 minutes on a weekly basis), the same amount of time the students from the control group spent on the learning programme set by the materials from different publishing houses. The students were assessed again in the last term -upon fully implementing the programme- using the same instruments.

Intervention programme

The reading learning programme used is made up of 65 sessions of 50 minutes each between October and April. Its objective was to explicitly develop the phonological skills and rapid automatized naming and to enhance alphabetic knowledge through shared reading practices. These practices consisted on combining reading aloud with dynamics whereby the students actively participated by answering different questions raised, by making questions and assumptions, by highlighting key ideas, by making up original endings of stories, etc.

All the contents were worked on in combination and progressively regarding their level of complexity, and they were organised in nine teaching units.

Reading dynamics focused on implementing the reading strategies through previous knowledge by promoting the skills that enhance control and regulation during the comprehension process. These strategies were sequenced in three specific moments: before, during and after reading. They also focused on analysing key aspects of the text: titles, chapters, illustrations, making predictions about the textual content, making questions and assumptions, identifying words that are unknown by the context, verifying those assumptions made, etc. A graphic organiser was used as visual support; this organiser was structured in three sections: introductions (where does it happen?

when does it happen? who are the characters?), middle (what is the problem? how is the problem solved?) and end (what happens in the end?).

Alphabetic knowledge was worked on using the shared reading practices outlined, by making the graphic representations of the sounds and the words known at a multi-sensorial level in order to promote alphabetic knowledge and to promote the child's participation and linguistic development.

This phonological awareness was worked on using the content of the tales through tasks of lexical segmentation, syllabic and phonemic awareness through playful activities of identification, comparison, classification, replacement and omission of syllables and phonemes. Lexical segmentation was worked on through tasks of recognition and comparison of words depending on their length, division of sentences made up of several words, creating sentences on the basis of a series of specific words and creating sentences according to a specific number of words. Syllabic awareness was worked on through activities of: recognition of the number of syllables in words having different syllables, identification of words depending on the initial and final syllable, replacement of syllables in words, and addition of syllables in the initial and final position. Phonemic awareness was worked on through tasks focusing on reforming words on the basis of phonemic synthesis, on identifying words depending on the initial and final phoneme and on replacing and omitting phonemes in words in different positions.

Rapid automatised naming was worked on through situations of naming different pictures quickly, such as numbers, letters, colours and objects, all of them related to the stories of the children's tales worked on. All these pictures were classified using a digital blackboard after performing the aforesaid activities. The activities included naming the indicated stimuli from left to right quickly, just like one does when

reading. The teacher and different students read both individually, in a small group, and in a collective way.

The control group followed the teaching set according to the textbook, which consisted on working on each of the letters of the alphabet independently in upper and lower case, associating each spelling to a picture (for example, t - table), combining them with different vowels to form syllables and consequently form different words. Orally, different words with the phoneme in the initial and final position were presented in order to reproduce them graphically. Finally, short sentences using those words learnt were formed and read.

Results

In order to analyse the change in the variables under study, different descriptive analysis were performed (means and standard deviations) using the scores obtained from the tests administered in the pretest and posttest stages and in the posttest-pretest difference. Further analyses of variance were also performed using the pretest scores (MANOVAs, ANOVAs) and analyses of covariance (MANCOVAs, ANCOVAs) of the posttest-pretest differences in between those students from the experimental and the control group regarding the variables measured before and after the intervention. These analyses were performed using the SPSS 20.0 software. The results of the pretest MANOVA for the whole of the variables showed that there were no significant differences between those students from the experimental and the control group before the intervention ($F(1.73)=2.46, p>.05$). Nevertheless, the MANCOVA results of the posttest-pretest differences, using the pretest scores as variables, were significant ($F(1.73)=2.31, p<.05$). These results show that the intervention programme had a significant impact. In order to analyse the changes in each variable, the descriptive and variance analyses presented in table 1 were performed.

Changes in phonological awareness

In order to analyse the effectiveness of the programme in the development of phonological awareness, the changes in the scores obtained from the PECO Test were analysed. The pretest MANOVA did not show any significant difference between those students from the experimental and the control group ($F(1,73)=2.52, p>.05$); nevertheless, the results of the posttest-pretest MANCOVA showed significant differences between both groups ($F(1,73)=3.34, p<.05$). When analysing each variable independently, differences were shown in the variable “syllabic awareness”, with greater increases among those students from the experimental group ($M =1.02$) than among those from the control group ($M =.72$). The results of the pretest ANOVA showed that *a priori* there are significant differences between both groups ($F(1,73)=3.37, p<.05$), and an ANCOVA of the posttest-pretest differences that showed significant differences was performed ($F(1,73)=5.32, p<.01$). Similarly, a greater increase among those students from

the experimental group ($M=1.08$) than among those from the control group ($M =.43$) was found in the variable “phonemic awareness”, and the posttest-pretest ANCOVA showed statistically significant differences between both groups ($F(1,73)=12.52, p<.001$). This shows an improvement in the ability to become aware of the minimum word units attributable to the intervention programme.

Changes in the reading support skills

In order to analyse the impact of the programme on reading support skills, the changes in the scores obtained from the BIL Test were analysed. The pretest MANOVA performed with the four variables measured (recognition of words, recognition of sentences, functions of reading and alphabetic knowledge) did not show any significant differences in the pretest stage between those students from the experimental and the control group ($F(1,73)=3.41, p>.05$), and no differences were found in the posttest-pretest MANCOVA either ($F(1,73)=2.62, p>.05$). The results of the ANCOVA for each one of the var-

Table 1. Means and Standard Deviations in phonological awareness, reading support skills, rapid automatized naming, reading words, pseudowords, grammatical structures and sentence comprehension and results of the variance and covariance analysis for the experimental and the control group.

Variables	Experimental Group (n = 402)						Control Group (n = 206)						Experimental - Control (n = 196)	
	Pre		Post		Post-Pre		Pre		Post		Post-Pre		Anova Pretest	Anova Postest-Pretest
	M	DT	M	DT	M	DT	M	DT	M	DT	M	DT	F (1, 73)	F (1,73)
PECO														
Syllabic Awareness	2.84	.34	3.86	.54	1.02	.35	2.90	.43	3.62	.37	.72	.64	3.37	5.32**
Phonemic Awareness	2.54	.41	3.62	.62	1.08	.62	2.60	.32	3.03	.94	.43	.38	2.62	12.52***
BIL														
Recognition of words	2.03	.53	2.28	.26	.25	.57	2.05	.43	2.26	.36	.21	.57	4.31	3.12
Recognition of sentences	2.02	.42	2.41	.31	.39	.34	1.99	.42	2.36	.42	.37	.51	2.06	2.67
Functions of reading	2.07	.56	2.63	.45	.56	.41	2.03	.81	2.56	.68	.53	.32	4.52	2.23
Alphabetic Knowledge	1.73	.72	2.36	.56	.63	.52	1.72	.64	2.30	.53	.58	.49	3.42	1.82
RAN														
Numbers	2.06	.34	2.34	.41	.28	.24	2.05	.45	2.26	.25	.21	.23	4.32	2.27
Letters	1.93	.36	2.75	.32	.82	.36	1.96	.43	2.28	.27	.32	.56	6.12	4.72***
Colours	2.12	.81	2.46	.67	.34	.43	2.10	.51	2.43	.36	.33	.61	2.71	3.23
Drawings	2.15	.42	2.62	.52	.47	.71	2.16	.63	2.41	.53	.25	.47	3.45	2.52*
PROLEC-R														
Reading words	1.72	.53	2.38	.43	.66	.43	1.71	.52	2.17	.84	.31	.42	2.63	4.37**
Reading pseudowords	1.45	.44	2.04	.45	.59	.51	1.42	.65	1.71	.66	.29	.63	2.47	6.18**
Grammatical structures	1.23	.61	1.97	.61	.74	.36	1.24	.73	1.44	.59	.20	.71	3.12	4.02***
Forming sentences	1.12	.47	1.75	.73	.63	.62	1.15	.61	1.33	.74	.18	.58	4.06	2.57***

* $p<.05$ ** $p<.01$ *** $p<.001$

ables showed a higher posttest-pretest increase among those students from the experimental group than among those from the control group, but such differences between both groups are not statistically significant, in terms of recognition of words ($M = .25$) compared to ($M = .21$) among those from the control group, in terms of recognition of sentences ($M = .39$) compared to ($M = .37$) among those from the control group, in terms of functions of reading ($M = .56$) among those from the control group ($M = .53$) and in terms of alphabetic knowledge ($M = .63$) among those from the control group ($M = .58$).

Changes in rapid automatised naming

In order to analyse the effectiveness of the programme in the development of rapid automatised naming, the changes in the scores obtained from the RAN Test were analysed. The pretest MANOVA performed with the four variables measured (naming numbers, letters, colours and drawings) did not show any significant difference in the pretest stage between those students from the experimental and the control group ($F(1,73) = 2.61, p > .05$). Nevertheless, significant differences were found in the posttest-pretest MANOVA, ($F(1,73) = 3.53, p < .01$), as well as in the posttest-pretest MANCOVA, ($F(1,73) = 3.38, p < .01$). As can be seen in table 1, as far as the variable "naming letters" is concerned, the sample of the experimental group has a greater increase ($M = .82$) compared to that of the control group ($M = .32$). The results of the pretest ANOVA showed that there were no significant differences between those students from the experimental and the control group at this stage ($F(1,73) = 6.12, p > .05$). Nevertheless, the results of the ANCOVA regarding posttest-pretest differences were significant ($F(1,73) = 4.72, p < .01$). As far as the variable "naming drawings" is concerned, there are also higher increases in those students from the experimental group ($M = .47$) than in those from the control group ($M = .25$). The results of the pretest ANOVA showed that *a priori* there are significant differences between both groups ($F(1,73) = 3.45, p < .05$), and an ANCOVA of the posttest-pretest differences that showed signif-

icant differences was performed ($F(1,73) = 2.52, p < .05$), which shows that there is an increase in rapid automatised naming as a result of the intervention programme.

Changes in the cognitive processes of reading

In order to determine whether the programme was efficient for the development of the cognitive processes involved when learning to read, the changes in the scores obtained from the PROLEC-R Test were analysed. The pretest MANOVA, performed for the series of variables of the test, showed that there were no significant differences between those students from the experimental and the control group ($F(1,73) = 2.47, p > .05$) at the pretest stage. Nevertheless, significant differences were found in the posttest-pretest MANOVA ($F(1,73) = 3.84, p < .01$), as well as in the posttest-pretest MANCOVA, ($F(1,73) = 2.52, p < .01$). As can be seen in table 1, as far as the variable "reading words" is concerned, the sample of the experimental group has a greater increase ($M = .66$) compared to that of the control group ($M = .31$). The results of the pretest ANOVA showed that there were no significant differences between those students from the experimental and the control group at this stage ($F(1,73) = 2.63, p > .05$). Nevertheless, the results of the ANCOVA regarding posttest-pretest differences were significant ($F(1,73) = 4.37, p < .01$). The results of the pretest ANOVA when reading pseudowords do not show any differences between those students from the experimental and the control group ($F(1,73) = 2.47, p > .05$); nevertheless, the results of the posttest-pretest ANCOVA ($F(1,73) = 6.18, p < .01$) were significant because, as can be seen, there is a greater increase among those students from the experimental group ($M = .59$) than among those from the control group ($M = .29$). This trend is also found in the variable "grammatical structures", where the pretest ANOVA does not show any difference between the students from the experimental and those from the control group ($F(1,73) = 3.12, p > .05$); nevertheless, the results of the posttest-pretest differences ANOVA ($F(1,73) = 4.42, p < .001$) and

those of the posttest-pretest ANCOVA were significant ($F(1,73)=4.02$, $p<.001$). The students from the experimental group experienced a significant increase in terms of comprehension of grammatical structures ($M=.74$) compared to those from the control group ($M=.20$). In last place, as far as sentence comprehension is concerned, the pretest ANOVA showed that there were no significant differences between those students from the experimental and the control group ($F(1,73)=4.06$, $p>.05$); nevertheless, both the posttest-pretest ANOVA ($F(1,73)=3.31$, $p<.001$) and the pretest-posttest ANCOVA ($F(1,73)=2.57$, $p<.001$) showed significant differences between both groups. As can be seen in table 1, the students from the experimental group experienced a significant increase in terms of sentence comprehension ($M=.63$) compared to those from the control group ($M=.18$). These results show an improvement of learning to read attributable to the intervention programme implemented.

Discussion and conclusions

This study aims at verifying if the efficiency of the decoding process is enhanced through a learning programme that includes shared reading practices combined with the implementation of phonological knowledge skills and the stimulation of rapid automatised naming, as well as if the former results in better comprehensive ability. The results obtained show that those dialogical reading practices that take the development of phonological awareness, alphabetical knowledge and rapid automatised naming into account are an efficient tool to improve the reading process in the first years of school.

It is found that interactive reading by the teacher with his/her students is a powerful resource when learning to read as it enables a greater development of their decoding skills and an enhancement of their comprehensive ability.

The data obtained from the study show that working on phonological awareness is an aspect that is involved during the initial stages of

learning to read and makes acquisition thereof easier, confirming the data obtained by other authors on the impact of phonological processes on the acquisition of this type of learning (Feld, 2014; Gutiérrez, 2016; Porta, 2012). This fact may be due to the fact that performing those activities that help children become aware of the segments of oral language, both at a syllabic and phonemic level -the latter to a greater extent-, makes the connection between oral and written language easier, an element evidenced in previous studies (Defior & Serrano, 2011; Gutiérrez-Fresneda & Díez, 2017).

Rapid automatised naming is also an important factor of the automatised process of the grapheme-phoneme relationship, which is involved in the development of a greater number of orthographic representations and has an impact when reading a great number of words globally and on better reading accuracy. Our data match those found by other authors when we state that rapid automatised naming is an important variable of the initial literacy process (Gómez-Velázquez *et al.*, 2010; González *et al.*, 2015).

As far as reading learning processes are concerned, the data obtained show that the intervention programme had a significant impact on the improvement of the reading accuracy of both words and pseudowords, which reveals that those students who participated in the programme experienced an improvement in terms of phonologic and orthographic processing that enables them to access words representation quickly and accurately. This element may also be conditioned by the command of rapid automatised naming, as its skills may help to make phonological tabs and graphic elements quickly after certain levels of reading are reached. As far as semantic processes are concerned, the group that participated in the programme also had better results in terms of comprehensive ability; this consequence is backed by the findings of those models that support the relationship between the decoding and reading comprehension processes (Ripoll, 2010; Tapia, 2016).

In short, this work promoted knowledge of these processes involved when learning to read, both in terms of word recognition, reading fluency and written information comprehension, which allows for designing activities that have an impact on the development of those skills identified as relevant. In this sense, it would be advisable to create intervention programmes that promote shared reading dynamics and rapid automatised naming activities to learn the alphabetic code, because learning to read is conducted in a more efficient way. This work proposes future lines of research linked to the need to work on the predictors of reading in an explicit and systematic basis in the first years of school. The fact that certain factors that can be significant at earlier ages were not taken into account limited this study and it would be advisable to bear them in mind in future research. Some of these factors are the shared reading practices performed by the parents at home, the motivation for reading and the reading habits of the family members, which can also be relevant when acquiring reading skills.

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