

Guzmán-Simón, F., Gil-Flores, J., & Pacheco-Costa, A. (2020). Home Literacy Environment and Reading Comprehension in Spanish Primary Education. *Journal of Research in Reading*, 43(2), 229-247.

**Title:** Home Literacy Environment and Reading Comprehension in Spanish Primary Education

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**Running Heads Title:** HLE and Reading Comprehension in Spain

### **Abstract**

**Background.** Research has suggested that one of the most important variables for the development of reading comprehension is the home literacy environment, composed of the literacy interface and what is known as the limiting environment. The current study investigated Spanish children's reading comprehension in relation to these two dimensions.

**Method.** Data have been drawn from measures of reading competence and the Learning to Read Survey undertaken for the 2016 PIRLS assessment in Spain. Our secondary analysis of the PIRLS 2016 data has enabled the production of two multiple regression models from a sample of 14,595 Spanish pupils aged 9–10 years old.

**Results.** The analyses performed have allowed us to determine the limiting environment elements that relate to the reading comprehension results. Moreover, they have highlighted the importance of the literacy interface prior to schooling. Both variables of the home literacy environment appear to be linked with the reading comprehension results taken from the PIRLS 2016 and may orientate the improvement of reading skills at home.

**Conclusions.** Our research supports the implementation of family literacy programmes in Spain, especially for low-income families, which might enhance their literacy interaction with their children in the early stages. The promotion of family literacy

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programmes oriented to pre-school children could improve not only emergent literacy skills but also the social value of literacy from a socio-cultural perspective.

**Keywords.** Home literacy environment, international assessment, primary education, reading comprehension, reading skills.

**Abbreviations.** IEA (International Association for the Evaluation of Educational Achievement), PIRLS (Progress in International Reading Literacy Study), IRT (Item Response Theory method).

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### **Implications for Practice**

What is already known about this topic:

- Reading comprehension is a crucial skill in education. Owing to its links with the common teaching and learning methods in primary education, a weak or late development of reading comprehension may impede academic outcomes.
- Literacy development may be influenced by the socioeconomic status of families. Although important, there are other familial factors influencing children's literacy development. For this reason, the concept "Home Literacy Environment" offers a wider perspective on the nature of the links between families and literacy.
- The home literacy environment has been described as the mixture of two different dimensions: the literacy interface and the limiting environment. An analysis of both dimensions shows the importance of the activities promoted and carried out by families (the literacy interface).

What this paper adds:

- There is a scarcity of research about the development of reading comprehension among primary pupils and its relationship with the home literacy environment in Spain. Family context is currently one of the less well-understood aspects of the Spanish educational system.
- The current research points to the Spanish families' limiting environment as one of the elements that may predetermine, from early childhood, the later development of reading comprehension.
- The research identifies variables within the home literacy environment which are more relevant to the development of reading comprehension.

Implications for theory, policy or practice:

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- The first implication is that literacy development and reading comprehension depend not only on the socioeconomic status but also on the number, nature and diversity of activities offered within a family. Improvement and enrichment of these activities could enhance pupils' reading comprehension.
- Both a limiting environment and the literacy interface have a fundamental role in Spanish pupils' reading comprehension, in line with previous research in other countries. Consequently, family programmes that aim to address specific aspects of the literacy interface and limiting environment could improve the literacy development of children.
- At the moment, for the most part, the Spanish education system has little opportunity to influence the limiting environment of children. Therefore, there needs to be more emphasis on the implementation of programmes designed for families, supporting and assessing activities related to the literacy interface. In Spain, these programmes are rare, so, for this reason, educational institutions and relevant social agents should collaborate to design and implement such programmes.

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### **Introduction**

Literacy development in children begins within the family environment as part of socially-situated communication, and may be described as a continuous process taking place during the first years after a child's birth (Gillen & Hall, 2013; Pinkham & Neuman, 2012). Families' involvement in children's early literacy development has been characterised as a series of activities undertaken by parents with their children (shared reading, games involving the alphabet, visiting the library and so on) (Timmons & Pelletier, 2015). These activities have been described as formal or informal (Sénéchal & LeFevre, 2002). Formal interactions involve direct literacy teaching, such as teaching the letters, whereas informal interactions include those practices where literacy is present, but not in an instruction-oriented way, such as shared storytelling. Both of them contribute to the development of different oral language skills, but their effects on literacy skills are diverse. For instance, formal interactions have a positive effect on word decoding, phonological awareness and word recognition, whilst informal interactions help to boost vocabulary and oral language skills (Sénéchal & LeFevre, 2002). It has been found that formal and informal literacy activities are associated with the family's demographic context and socioeconomic status, and are known as the home literacy environment (Burgess, Hecht, & Lonigan, 2002; Weigel, Martin, & Bennett, 2006; Yeo, Ong, & Ng, 2014).

The home literacy environment, understood to be a multidimensional and dynamic construct, is “characterized by the variety of resources and opportunities provided to children as well as by the parental skills, abilities, dispositions, and resources that determine the provision of these opportunities for children” (Burgess et al., 2002, p. 413). Burgess et al. (2002) describe six interrelated conceptualisations that

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form the home literacy environment with the sum of these being the *Overall HLE*. The activities in which parents and children interact in literacy-oriented activities, such as shared reading, rhymes and songs, or literacy games, constituted the *Active HLE*. Those interactions in which children learn indirectly from the habits of their parents, from a passive perspective, such as seeing their parents reading or watching educational TV programmes, are also part of the home literacy environment but these constitute the *Passive HLE* (Bracken y Fischel, 2008; Burgess et al., 2002). Burgess et al. (2002) also considered *Shared reading* as a home literacy environment conceptualisation, owing to its continuous presence in the research on family literacy interactions. In their research, the diverse conceptualisations of the home literacy environment were related with positive effects on preschool children's letter knowledge, phonological awareness and oral language skills, especially relevant when the active dimensions of home literacy environment were taken into account.

The home literacy environment included two more conceptualisations, the *Limiting environment* and the *Literacy interface* (Burgess et al, 2002; Burgess, 2011). The limiting environment comprises demographic measures, as well as the family's socioeconomic status, and includes the parents' reading competence and their attitude towards reading and learning. The limiting environment embraces all the available resources, whether material ones (number of books at home, for instance) or the caregivers' and siblings' competences that might influence the literacy development of children. The literacy interface combines the activities in which parents and their children participate, including those specifically aimed at developing or motivating the children's interest in literacy, such as shared reading or games using the alphabet, as well as other activities not directly related to literacy. According to this

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conceptualisation of the home literacy environment, playing with letters could be considered within the active conceptualisation of the home literacy environment, as well as belonging to the literacy interface.

To an extent, the literacy interface involves those interactions described as formal or informal by Sénéchal and LeFevre (2002). However, the literacy interface, as described by Burgess, also comprises the measures of “parental interest” in literacy and “parental motivation” (Burgess, 2011). “Parental motivation” embraces those parental activities oriented to encouraging children’s interest in literacy, whereas “parental interest” includes the observational opportunities that could contribute to the transfer of literacy learning values and behaviours. The parental interest dimension has been described as more parent-centred, whilst parental motivation is child-centred (Burgess, 2011).

In our research, we focus on the conceptualisations of the limiting environment and literacy interface. We propose that the nature and categories of our data may be better explained by taking into account these two dimensions. Thus, in the present work we aim to study the extent to which the characteristics of the home literacy environment are related to the level of reading comprehension among Spanish pupils attending primary school, given the crucial role played by reading comprehension within the global context of school-based education and learning. Although the educational system in Spain does not substantially differ from other Western countries, the low scores achieved in periodic assessments, as well as the absence of research linking the two dimensions of the home literacy environment to the results of reading comprehension assessments in Spain, has led us to carry out this study within a Spanish population. To

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this end, we have based our study on the data collected by the Progress in International Reading Literacy Study's (PIRLS) assessment tests carried out in 2016.

## **Theoretical Framework**

### **Reading Comprehension and Literacy Interface**

The relevance of the home literacy environment for children's reading development has been the subject of several studies over the last twenty years, as reflected in recent papers by Hofslundsengen, Gustafsson and Hagtvet (2018), Marsh, Hannon, Lewis and Ritchie (2015), Mascarenhas et al. (2017) and Neumann (2016), among others. Parents' engagement in literacy activities at home has been pointed to be relevant to children's reading comprehension (Baker & Scher, 2002) as well as to their interest in reading and print (Weigel et al., 2006). Similarly, the type and frequency of these literacy activities tend to be associated with the educational level of families (Bracken & Fischel, 2008).

Family literacy activities are, most often, shared reading, visiting the library, conversations and other verbal interactions about reading, reciting rhymes, story-telling, drawing, and singing or playing (Bracken & Fischel, 2008; Weigel et al., 2006). However, not all these activities have the same relevance in terms of the development of children's reading comprehension. For instance, visiting the library with children and singing have a weaker impact (Burgess et al., 2002; Mascarenhas et al., 2017; Yeo et al., 2014) than shared reading (Baker, 2013; Burgess et al, 2002; Mascarenhas et al., 2017; Steiner, 2014; Yeo et al, 2014). Moreover, the conversations and interactions promoted by shared reading (Hill & Diamond, 2013; Mol, Bus, de Jong, & Smeets, 2008) enable children to develop certain skills and attitudes, such as the increase of



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vocabulary (Harvey, 2016), text comprehension or the enjoyment of reading (Jung, 2018). Overall, research indicates that these literacy interactions have an impact on children's reading development.

Furthermore, the frequency of the family literacy activities, as well as the age of children when these interactions take place, should be considered. Another point is that the performance of certain activities does not have a positive effect in some cases, with the degree of their influence depending on the kind of interaction promoted (Cairney, 2003), and on cultural and social practices such as gender roles, the prevalence of oral language activities as opposed to print literacy, and the possible tensions between home and school literacy practices (Anderson, Anderson, Friedrich, & Kim, 2010).

### **Reading Comprehension and Limiting Environment**

The relationship between the socioeconomic status of parents and the development of reading comprehension in their children has become a recurrent indicator in education research (Auerbach, 1989; Gil Flores, 2013; Saracho, 2017). Children coming from families with lower socioeconomic status tend to achieve poorer scores in reading comprehension tests and show less interest in their literacy development compared with those children coming from medium or high socioeconomic status backgrounds (García Montalvo, 2013; Gómez Vera, 2008; Yeo et al., 2014). Socioeconomic status may have an impact, to a great extent, on the level of parental interest in reading (Gil Flores, 2009), the level of interaction between parents and children (Morgan, Nutbrown, & Hannon, 2009), the number of literacy activities performed at home (Neumann, 2016; Weigel et al., 2006), and the type of resources used in the home literacy interface (Baker & Scher, 2002).

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The parents' educational level is also a determining factor for the literacy development of children (Baker, 2013; Hofslundsengen et al., 2018; Yeo et al., 2014), being a predictor of linguistic skills and the development of children's emergent literacy (Bracken & Fischel, 2008). The number of books at home is another indicator of the reading performance of children (Griffin & Morrison, 1997; Harvey, 2016; Puglisi, Hulme, Hamilton, & Snowling 2017), either the total amount of books (Mascarenhas et al., 2017; Sénéchal, 2012) or the number of children's books (Sénéchal, 2006; Swain & Cara, 2017). The amount of reading books depends in most of cases on the family's socioeconomic status (Merlo, Bowman, & Barnett, 2007).

Parents' reading skills may also be considered as part of the limiting environment (Puglisi et al., 2017). It has a stronger influence on children's reading comprehension than the educational level of parents (van Bergen, van Zuijen, Bishop, & de Jong, 2017) or annual income (Wasik & van Horn, 2012).

Finally, a lower competence in the use of school language may be linked to the multilingual context of some children, where the heritage language is different to that used by the school. This situation may become a relevant variable in the literacy development of children, as part of the limiting environment (Wasik & van Horn, 2012; Yeo et al., 2014). Previous research has pointed to the differences in the input received by children in activities such as storytelling (Stavans, 2012; Steiner, 2014) and shared reading (Wessels, 2014) depending on the use of the heritage or school language. There are some controversial aspects about the concept of a limiting environment and its dimensions. Although socioeconomic status has been considered as a relevant

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indicator of the impact of the home environment on the literacy development of children (Burgess, 2011; Mascarenhas et al, 2017), recent research has highlighted its small, predictive role for parent-children interactions, linking socioeconomic status just to the resources available at home (Myrttil, Justice, & Jiang, 2019). Some research also points to the diversity of literacy beliefs and practices observed in low-income families (Davis et al., 2016), and highlights the relevance of literacy interactions regardless of the family's income (Grieshaber et al., 2011). It has been also pointed out that any predictive analysis aiming to assess the role of socioeconomic status should involve heterogeneous samples (Sénéchal, 2006). Moreover, doubts about the relevance of socioeconomic status as a predictor of literacy development arise in research focused on the role and use of digital media in literacy, where the influence of socioeconomic status is still not clearly defined (Neumann, 2018).

As stated by Phillips and Lonigan (2009), the relations between family interactions and socioeconomic status are complex and not linear. Therefore, the concept of a limiting environment, embracing not only material resources but also a broader concept of the resources at children's disposal, permits a broader approach to the analysis of the relations between the home literacy environment and language development (oral language, phonological sensitivity and word decoding), which may not be feasible using just socioeconomic status indicators as a measure (Burgess et al., 2002).

Another controversial aspect of the home literacy environment is its frequent association with early childhood, prior to any formal schooling. Disparities between diverse educational systems and models in different countries or linguistic groups have

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forced researchers to reconsider the home literacy environment's effects on literacy development in older children (Sénéchal, 2006; Tamis-LeMonda, Luo, McFadden, Bandel, & Vallotton, 2019). The disparity of educational systems worldwide has motivated research on so far overlooked aspects of the home literacy environment, such as the children's interest in literacy (Carroll, Holliman, Weir, & Baroody, 2019).

Within this diversity, the Spanish educational system yet to be analysed from the home literacy environment perspective. From the existing literature and given the absence of studies exploring the home literacy environment in the Spanish educational context, we set out to measure its importance in the reading comprehension of primary school pupils. For this purpose, we focused on the literacy interface established between parents and their children before they started school. We also assessed the role of this interface in relation to the home family environment, because these two conceptualisations of the home literacy environment are the most appropriate for the analysis of PRILS data. Accordingly, we set the following objectives:

- a) To identify the features of the limiting environment contributing significantly to an explanation of the levels of reading comprehension achieved by Spanish primary education pupils.
- b) To assess if the literacy interface practices performed at home play a role within the explanation of reading comprehension, when limiting environment variables are controlled.

## **Method**

### **Research Design**

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We carried out a secondary analysis of the data derived from Spanish pupils taking part in the PIRLS assessment in 2016. This assessment is performed every five years by the *International Association for the Evaluation of Educational Achievement* (IEA). We adopted an ex-post-facto design, using both a descriptive and correlational approach. PIRLS focuses on the assessment of reading comprehension, providing additional information about learning contexts obtained from the pupils' families and their schools. Spain was one of the 50 participating countries in the 2016 PIRLS. A total of 14,595 Spanish pupils aged between 9 and 10 years old who were attending primary education participated in the assessment. 50.6% of the participants were boys, and 49.4% were girls. This sample was obtained through random sampling, stratified by region and type of school (private or public) in two stages. Firstly, a selection of schools was made and, secondly, from each of the schools, all the pupils from one or two classes of 9–10 years old pupils were chosen. To correct the differences in the probability that an individual was chosen to be part of the sample, a sampling weight was assigned to each of them, taking into account the classroom groups and school size. The PIRLS data collection includes two dimensions in the written tests measuring the reading comprehension: reading purpose and comprehension processes. The reading purpose involves reading as a literature experience, as well as the acquisition and use of information, whereas the comprehension processes involve obtaining information, making direct inferences, and interpreting, integrating and assessing. Apart from the written tests, questionnaires were distributed to the children, their parents or caregivers, teaching staff and school principals. The purpose of the questionnaires was to provide contextual information relevant to the reading comprehension of the pupils. The administration of tests and questionnaires took place between March and May 2016, and the resultant database is available online

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<https://timssandpirls.bc.edu/pirls2016/international-database/index.html>. In the current research, the unit of analysis considered is the pupil. Therefore, the global score for each participant in reading comprehension has been extracted from the PIRLS 2016 database, along with diverse variables concerning family context. They have been selected according to features that, in accordance with the reviewed literature, could be relevant to explain their reading comprehension scores.

### **Variables**

Given the aims of our research, the outcome variable is the level of reading comprehension. Standardised written tests were administered in PIRLS in order to derive this level. These tests consist of reading passages, accompanied by multiple-choice and constructed-response questions. According to the method applied by PIRLS 2016 (Mullis & Martin, 2015), the estimation of reading comprehension is based on the Item Response Theory method (IRT thereafter), as well as on the plausible values estimation, this being a common method for large scale assessments (Wu, 2005). Five plausible values were calculated for each student representing his or her achievement. The estimated values are expressed on a scale for which the standard deviation is 100 and the average is set at 500. This mean corresponds to the average performance in the first PIRLS assessment carried out in 2001.

The predictor variables have also been extracted from the PIRLS database and are based on Burgess et al.'s (2002) elements of the home literacy environment, namely literacy interface and limiting environment. The abbreviation of each variable correspond to the denomination of PIRLS in the Spanish tests, and thus appear in parentheses.

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### **Literacy interface of parents and children within the home environment.**

For this aspect we applied the Early Literacy Activities Scale. It consists of a scale constructed for PIRLS through IRT proceedings, specifically appealing to the partial credit model by Rasch (see Martin, Mullis, & Hooper, 2017, for further detail). The central point of the scale was set to 10, matching the average achieved by countries taking part in PIRLS (2001). The standard deviation was set to 2. The scale shows the frequency of parent and child interactions at home before the children began primary school that could contribute to the child's emergent literacy. The scale is derived from the parents' answers to nine items (question 2 of the PIRLS home questionnaire), gathering the frequency (*never or almost never, sometimes and often*) with which parents read books with children, told them stories, sang songs, played games involving the alphabet, talked to them about what they had done or read, played word games, wrote words and letters, or read aloud signs and labels. Although the home literacy environment is commonly associated with samples of primary age and pre-school children, recent longitudinal research has argued that the home literacy environment in preschool children is stable ten years later (Tamis-LeMonda et al., 2019), and that early literacy interactions are transmitted to later schooling indirectly through kindergarten experiences (Sénéchal, 2006). Tamis-LeMonda et al. (2019) have described two ways in which early learning experiences persist: the cascade model and the stability of learning environments. For both there is a clear connection between early childhood literacy and later academic achievements (Tamis-LeMonda et al., 2019). The PIRLS database provides scores on a scale (ASBHELA variable) and a derived categorical variable (ASDHELA), for which three levels were established, matching the answer

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modalities used for the nine items. Both the scale-measured and categorical variables were employed in the current research.

### **Limiting environment within the home environment.**

This comprises the following group of variables available from the PIRLS database:

- Parents' enjoyment of reading (ASBHPLR) is an index constructed in a way similar to the one described for the Early Literacy Activities Scale. It is based on nine items of which eight (question 12 in the home questionnaire) offered the parents a series of statements about reading, such as "I enjoy talking to others about my current reading" or "I enjoy reading." For each statement, parents expressed their agreement on a four-point scale from *strongly disagree* to *totally agree*. The answers were inversely recoded in the case of negative formulation. The ninth item (question 11 in the questionnaire) asked about the frequency with which they read for pleasure at home on a four-point scale from *never or almost never* to *every, or nearly every, day*.
- Amount of parental reading at home (ASBH10) was measured by question 10 from the home questionnaire, in which parents were asked about the amount of time they devoted to reading at home, either books, magazines or newspapers, and included both print and electronic texts.
- Number of books at home (ASBH13) corresponds to question 13 of the home questionnaire, and it asks about the number of books at home excluding e-books, magazines, newspapers or children books.



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- Number of children's books at home (ASBH14), question 14 of the home questionnaire, asked how many children's books there were at home, excluding children's e-books, magazines and school books.
- Study supports at home (ASDG05S) is based on question 5 of the student questionnaire, which asked pupils about the availability of a room for their own use and internet access at home.
- School language using at home (ASBH17) derives from asking the families about the frequency of speaking the same language at home as that used for the PIRLS tests (question 17 from the home questionnaire).
- Educational level of parents (ASDHEDUP) is based on the answers to question 18 of the home questionnaire, where caregivers were asked about their academic level. This variable's value is the maximum level obtained by both of them.
- Occupational level of parents (ASDHOCCP) comes from the answers to question 20 of the home questionnaire, about the kind of job parents have. The value reflects the level achieved by both the father and the mother.

Table 1 shows a list of the variables considered and, when needed, the corresponding categories, also including descriptive statistics. For each variable, means and standard deviations are presented or, depending on the measuring level, percentages.

[Table 1 about here]

## **Data Analysis**

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Two regression models have been designed in order to explain the level of reading comprehension achieved. In the first one, variables related to the literacy limiting environment have been included. Keeping those whose effects have been significant, the second model incorporates the variable about parents' literacy interface within the home environment. Its purpose is to explore whether or not this variable helps to explain the pupils' reading comprehension when other relevant family features are controlled for. Next, a contrast of measures for the levels of reading comprehension achieved by the students was performed among those whose fathers and mothers differ in the frequency of early literacy activities at home. In order to analyse this difference, a Cohen's  $d$  was also calculated, as a measure for the effect size.

In all of the analyses, the sampling weights assigned to each participant have been considered. In order not to undervalue the standard errors within the estimated parameters, the jackknife replication method has been applied, carrying out 150 repetitions. When the reading comprehension variable was involved, all five plausible values from every individual have been taken into account. Analyses have been performed using IDB Analyzer 4.0 software (IEA, 2018), which makes it possible to work with plausible values and sampling weights, and generates macros suitable to be executed in SPSS.

## **Results**

In order to contrast the value of the analysed variable within the explanation of the reading comprehension achieved by pupils, we have built two regression models. In both cases the outcome variable is the reading comprehension and the predictor variables are those that characterise the limiting environment (see table 2). With model

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I, which includes variables concerning the limiting environment, 15% of the variance in the reading comprehension scores is explained, according to the coefficient of determination  $R^2 = 0.15$ . This model confirms the positive effect that socioeconomic status, reading resources available at home, parental reading habits or the use of the same language at home and in the school may have on reading comprehension. Turning to the values of the standardised coefficients  $\beta$ , the major contribution to the reading comprehension explanation corresponds with the educational and occupational levels of parents. Their effects increase when the parental occupational level is as professionals compared to unemployed parents ( $\beta = 0.27$ ;  $p < 0.01$ ), or when parents have studied in higher education compared to those who had primary education or who were uneducated ( $\beta = 0.24$ ;  $p < 0.001$ ). According to this model, pupils whose mother or father works as a professional would reach 34.61 points more in reading comprehension compared to those whose parents are unemployed. When only one parent has a university degree, the difference is 30.76 points compared to the children of parents with a primary education or uneducated. Another variable relevant for reading comprehension is the number of books at home. Having over 25 books had a significant effect ( $p < 0.001$ ) when compared with the pupils who had fewer than 10 books at home, with  $\beta$  values between 0.08 and 0.10. For the number of children's books, the effects are significant when there are more than 50 books ( $\beta = 0.07$ ;  $p < 0.05$ ) and are even greater if there are more than 100 books at home ( $\beta = 0.10$ ;  $p < 0.001$ ). Keeping other variables constant, the use of the school language at home also has a significant effect ( $\beta = 0.13$ ;  $p < 0.001$ ) on reading comprehension. Pupils who always use the school language at home scored 17.12 more than those coming from homes where the school language is never used. The effect of the time parents read at home is significant when it exceeds 10 hours per week ( $\beta = 0.05$ ;  $p < 0.05$ ). With other variables being

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equal, pupils' reading comprehension scores were 8.447 points lower if their parents read for less than one hour per week. Finally, the study supports and parents' enjoyment of reading were not found to be relevant in the explanation of reading comprehension, and they were discarded when building model II.

[Table 2 about here]

Model II includes the variable concerning literacy interface and shows a slight increase in the percentage of the variance explained in the reading comprehension variable ( $R^2 = 0.16$ ). In this model, the effects observed in Model I continue to be significant, especially the effects of the educational and occupational levels of parents. For these variables, higher categories keep the effects quantified in  $\beta = 0.24$  ( $p < 0.001$ ) y  $\beta = 0.25$  ( $p < 0.01$ ) respectively. With small changes, the effects linked to the amount of parental reading at home, number of books and children's books at home and school language used at home, are maintained. When values in all these limiting environment variables are kept constant, the performance of early literacy activities at home corresponds with one of the most significant effects ( $p < 0.001$ ) on reading comprehension. According to the model, for each unit in which the score in this scale is raised, the reading comprehension of pupils would increase by 3.57 points. Regarding the standardised coefficient ( $\beta = 0.10$ ), the importance of carrying out literacy interface activities before schooling is greater than the number of books and children's books at home, or the amount of time parents devote to reading. In short, controlling the effect of variables relevant to the socioeconomic and educational status of families or the use of a language other than the one used by the school, the literacy interface that families performed with their children before they began compulsory schooling is likely to

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constitute a significant factor in the explanation of the reading comprehension of Spanish pupils in year 4 of primary school.

In order to complete this analysis, table 3 shows the values of reading comprehension in accordance with the literacy interaction between parents and children, taking into account the categorical variable which makes reference to it. Owing to the fact that, in the current analysis, this variable never or almost never reached a frequency bigger than 1% (see Table 1), the analysis of categories has reduced them to *never*, *almost never* or *sometimes* (value 0) and *often* (value 1). In the case of those students whose mothers and fathers carried out activities such as shared reading, storytelling, singing songs or playing with words or letters, among others, the level of reading comprehension is 542.19. On the contrary, if this kind of activities didn't take place frequently, the reading comprehension level is 518.39. The effect size for the difference noticed is medium, reaching a  $d=0.38$  value.

[Table 3 about here]

## Discussion

The current research has focused on the analysis of the characteristics of the home literacy environment of Spanish primary school pupils, aiming to evaluate its relationship to the reading comprehension level achieved in PIRLS 2016. According to the results obtained, it may be supported the relevance assigned to the limiting environment and the literacy interface in previous research, where both of them have been highlighted as predictors of reading comprehension in basic educational levels as well as pupils' academic progress (Baker, 2013; Phillips & Lonigan, 2009).

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More specifically, the first of our objectives sought to analyse the contribution of the different elements present in the families' limiting environment to the explanation of reading comprehension among primary school pupils. We have indicated the important role played by the educational and occupational levels of parents, thus matching the results of previous research that found a link between these variables and reading comprehension (Bracken & Fischel, 2008; Neumann, 2016; Weigel et al., 2006). Both variables constitute indicators commonly used to characterise the home limiting environment, along with the resources available at home. In relation to the latter, previous work has emphasised the association between the number of books available at home and reading comprehension (Harvey, 2016; Swain & Cara, 2017). Consistent with these results, the current research has identified the number of books at home as a particularly relevant variable for the explanation of reading comprehension, whether they are books in general or children's books.

In addition, our data provided evidence for a link between the home and school languages, and the parents' reading habits (both of which are included in the limiting environment). These results agree with those described in previous research. For instance, Yeo et al. (2014) have noted the influence of the mother tongue on the reading skills of children aged 6, and Macarenhas, Moorakonda, Agarwal, Lim, Sensaki, et al. (2017) have shown how the mother tongue of caregivers of a 12 month-old child is a measure that, among others, may influence their later reading development. This circumstance is compounded when added to low socioeconomic status (Davis et al., 2016; Marcella, Howes, Fuligni, & Allison, 2014). Likewise, research by Baker and Scher (2002) and van Bergen et al. (2017) has revealed the connection between the

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reading habits of parents, their attitude towards reading and the reading development of their children. We propose that this is a variable that should be considered in the models that explain reading comprehension, given that the number of books at home does not necessarily imply a frequent reading habit among families (Grieshaber, Shield, Luke, & Macdonald, 2012).

The second objective of the current research focused on the role played by the literacy interface to explain the pupils' reading comprehension. Our results, in line with the research by Burgess et al. (2002) and Yeo et al. (2014), have highlighted the potential predictive capacity of the literacy interface for later reading comprehension. As described in the Home Literacy Model, both formal and informal interactions at home, most of which find their place within the broad concept of the literacy interface, contribute to the development of skills influencing vocabulary acquisition and later reading comprehension (Sénéchal & LeFevre, 2014). Furthermore, the effects of these interactions in early childhood persist in the school years (Inoue, Georgiou, Parrila, & Kirby, 2018; Sénéchal, 2006; Tamis-LeMonda et al., 2019). We suggest that this predictive capacity is verified along with other variables from the limiting environment, such as the families' socioeconomic status, which has been described by Sénéchal (2006) as a moderator of the impact of the literacy experiences at home.

The link between socioeconomic status and learning has been widely studied and is a major concern for the institutions responsible for educational policies. Greater equality in education might be attained if the connection between socioeconomic status and academic outcomes is weakened.

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Any intervention aiming to improve the PIRLS results should be oriented towards the betterment of young people's limiting environment, especially of the activities that help with literacy interaction within families. The results obtained in the current research show that reading comprehension levels cannot be explained solely by variables hard to modify in a short time, such as the resources available at home, or the educational and occupational levels of parents, all of which are part of the limiting environment.

In addition, the literacy interface also plays a prominent part in reading development. While the limiting environment may be described as a static measure, the literacy interface is an active one and thus may be modified, developed and enriched. The significant relations between the aforementioned aspects of the limiting environment, as well as the literacy interface, may suggest that the effects of both dimensions in early childhood can be found at least four years later. In this regard, the results obtained in the Spanish context coincide with those of Tamis-LeMonda et al. (2019), who found a significant stability in the learning environment of children from their early years until they were 10-11 years old in the USA. This transmission may be noticed in the limiting environment measures, but also in the literacy interface, which has a dynamic nature and may evolve over time, adapting to the children's development and interests. This fact opens the door to diverse possibilities for interventions designed for socioeconomically-deprived families. It would be possible to optimise the literacy interface of families with a low limiting environment through schemes to promote parental involvement in literacy interface activities (Alston-Abel & Berninger, 2017). It has been shown that the implementation of programmes that offer mentoring for families in literacy interface activities has had positive effects on the development of



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linguistic skills (Mol et al., 2008; Steiner, 2014) and reading comprehension in their children (Hill & Diamond, 2013; Saracho, 2017; Sénéchal & Young, 2008). However, in Spain there is currently a scarcity of this kind of programme, and there is no nationwide programme, as happens in other Western countries. For instance, the current *Plan de Fomento de la Lectura* (Plan for the Promotion of Reading) designed by the Spanish Ministry of Education, Culture and Sport for 2017-2020 does not include any action involving families in its Strategic Line 2 (Promotion of Reading in Educational Settings) (Ministerio de Educación, Cultura y Deporte, 2017). Interventions of this kind could potentially enhance the home literacy interface and could offer a way to overcome the differences in reading efficiency among pupils coming from different home literacy environments.

### **Practical implications**

The main practical implication of our research is the implementation of home literacy actions involving families so that fruitful literacy interactions can be developed at home, thereby making the home environment less limiting. The promotion of family literacy programmes oriented to pre-school children should boost not only emergent literacy skills but also the social value of literacy from a socio-cultural perspective. We believe that regional and government educational administrations should lead these actions, which should not overlook the crucial role of families in children's literacy development prior to attending school (Tamis-LeMonda et al., 2019). To assist in the effectiveness of such programmes, issues such as instructors' professionalism, skills and time available for parents, or the tracking of further application of that interaction at home, among others (van Steensel, McElvany, Kurvers, & Herppich, 2011), should be attended to. However, any initiative of this kind should also leave space for the interests

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of children, owing to their relevance in the later success of literacy activities (Baroody & Diamond, 2012; Carroll et al., 2019).

### **Limitations**

The research reported here has some limitations. One of the most obvious is that the data about the home literacy interface before the children studied started school are not the result of direct observation. On the contrary, they are based on retrospective information provided by parents when their children were 9 or 10 years old and were already attending primary school. The intervening passage of time increases the risk of inaccurate memories, with the possibility of misstatements being added to by self-report techniques that can be affected by social desirability or lack of sincerity in the answers. Another limitation derives from the correlational design adopted, which allows the setting of associations between variables, but not causal relations between them. Finally, the sample is drawn from the Spanish educational system, thus limiting the possibilities of generalising any conclusions to other countries.

Nonetheless, it is important to emphasise the large sample size, which is a strength, as is the representativeness of the PIRLS sample, along with the methodological rigour typical of international assessments promoted by IEA, which permits greater trustworthiness in the quality of procedures and the data derived from them.

For future research, it would be worth focusing on the design, application and assessment of programmes designed to enhance the literacy interface for families whose children would benefit from support, including those who were unable to continue their

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studies or who live in deprived circumstances, or whose language differs from the one used at school. The results of the current research indicate the value of developing family literacy programmes for low-income environments in Spain.

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