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The importance of Home Environment in Early Age for later Literacy Development

Sara ESMAEELI *Maître de conférences*
Department of Early Childhood Education
University of Stavanger
Ase Kari H. WAGNER *Professeur des universités*
National Centre for Reading Education and Research
University of Stavanger

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The main aim of this article is to explore these promising, and possibly protecting factors (such as the HLE) that may help to promote children's early literacy development, which consequently can have a positive effect on their later reading skills at school. This paper sums up some relevant findings from two studies based on the "On Track" project (Lundetræ et al., 2017) to elaborate our understanding about the vital and long-lasting role of HLE in children's both early and later literacy development. *Study* 1 investigates the relation between three domains of HLE (access to print; reading related activities at home; and parents' own reading interest and habits), children's code-related emergent literacy and parents' FR statuses while accounting for parents' education (Esmaeeli, 2022). *Study 2* aims (a) to investigate the association between the HLE and children's emergent literacy skills with second grade reading skills (Esmaeeli, 2019), and (b) and to test the role of HLE as a protective factor for later reading skills by adding the FR status in this model.

Mots-clés :
Early Childhood, Early literacy, Home Literacy Environment, Reading Skills, "On Track" project

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Introduction

Literacy development is vital for children's learning and participation in school, and for future participation in the work market and in society. A large body of educational research has shown that children's family SES (socio-economic status; in particular parents' education, but also books and other resources in the home) is one of the most influential factors in predicting academic achievement (Sirin, 2005; Hattie, 2008; Myrberg & Rosén, 2009). For instance, 10-year-old children from high SES homes have shown higher reading achievement than children from homes with few resources (Mullis et al., 2003; 2007; 2017).

Research has also shown that aspects of children's home literacy environment (HLE), such as parents' reading related activities with their children in pre-school age (e.g., reading books, telling stories, singing songs) or parents' own positive attitudes towards reading may influence children's literacy development from an early age on (Mullis et al., 2003; 2007; 2017). The relationship between the HLE and children's literacy development has remained positive even after socio-economic status (SES) is controlled

for (Esmaeeli et al., 2019; Støle et al., 2020).

In an equity perspective, it is therefore vital to explore such possible protective or compensating factors for children's reading development, especially for children who are at risk of reading difficulties in later school age. One of these at-risk groups is known as Family Risk of reading difficulties (FR). The term FR children refers to children with a history of reading difficulties within the family, such as having at least one parent or an older sibling with reading difficulties (Snowling & Melby-Lervåg, 2016). Independent of which language these children speak and learn to read, the FR children show poorer pre-school emergent literacy skills and are at higher risk of developing reading difficulties in later school age than children without such a risk (Non-FR families) (Snowling & Melby-Lervåg, 2016). In addition, the HLE in FR families, especially with low SES, has been reported being not as rich as the HLE that Non-FR families provide for their children (Dilnot et al., 2017; Esmaeeli et al., 2018).

This study

The main aim of this article is to explore these promising, and possibly protective factors (such as the HLE) that may help to promote children's early literacy development, which consequently can have a positive effect on their later reading skills at school.

Reading is a complex developmental skill involving the interaction of different factors at different levels: genetic, cognitive, and environmental (Pennington, 2006). Accordingly, these factors influence the development of children's emergent literacy skills, which are prerequisites for the development of later literacy skills. For example, FR, as a proxy for genetic and environmental factors, may operate as a risk factor that can increase the risk of reading difficulties because it can negatively influence not only the HLE but also children's emergent literacy and later literacy skills (Esmaeeli et al., 2018; Pennington, 2006; van Bergen et al., 2014). Environmental factors such as the HLE, however, can operate as either/or both risk and protective factors. For example, Esmaeeli et al. (2019) found that the HLE can be considered as a potential protective factor against risk factors such as FR and emergent literacy difficulties.

For this purpose, we sum up some important findings from two studies based on the "On Track" project (Lundetræ et al., 2017) to elaborate our understanding about the vital and long-lasting role of HLE in children's both early and later literacy development. *Study* 1 investigates the relation between three domains of HLE, children's code-related emergent literacy and parents' FR statuses while accounting for parents' education. The three factors of HLE are consisted as (I) access to print; (II) reading related activities at home; and (III) parents' own reading interest and habits. This multifactorial model tests the role of HLE as a protective factor against the risk of FR for children's emergent literacy outcomes at the onset of formal reading instruction (Esmaeeli, 2022). *Study 2* aims (a) to investigate the association between the HLE and children's emergent literacy skills with second grade reading skills (Esmaeeli, 2019), and (b) and to test the

role of HLE as a protective factor for later reading skills by adding the FR status in this model.

Methods

Participants

Our sample was a sub-sample from the longitudinal project "On Track". Altogether, 1,171 six-year-old children joined the project at the beginning of Grade 1, which is the onset of formal reading instruction in Norway. Second-language speakers, children with known disabilities or those who had participated in any known language or literacy program were excluded from our sample. In addition, children whose parents did not consent to their participation, did not provide information on their own reading difficulties status or answered "I don't know" in response to this question were excluded from our sample as well. For *Study 1*, the sample consisted of 794 children (mean age = 6.22, SD =.28; boys = 48.5%). For *Study 2*, besides the above-mentioned exclusion criteria, children from the schools that were randomly assigned to the intervention by the "On Track" project were excluded, and the final sample was 208 children (mean age = 6.21, SD =.28; boys = 45%).

Procedure

As first grade is the onset of formal education in Norway, schools usually invite parents to attend a welcome meeting. At this meeting, the research group gave parents both written and oral information about the project and invited them to take part in the "On Track" project. Parents also received a parental consent form and a questionnaire regarding demographic information, the HLE and FR status to be completed later at home. At the beginning of first grade, participating children were individually tested by eighteen trained researchers in emergent literacy skills, using digital tablets. For *Study 2*, children were also tested in literacy skills at the end of second grade.

Measures at the beginning of Grade 1

Parents' questionnaire

Parents answered a questionnaire regarding their educational level, the status of their own reading difficulties (referred to as FR status), their HLE, in addition to the gender of the child and the years of kindergarten attendance.

a. *Parents' education:* For *Study 1*, parents who had completed a university degree were considered to have a high educational level, while those with a diploma from upper secondary school or less were considered to have a low educational level. For *Study 2*, we made a sum score of parents' educational level.

b. *FR status:* For both *Study 1* and *Study 2*, a positive response to the questions on the status of parents' own reading difficulties from either the mother or father was sufficient to identify as FR. The term 'Reading difficulties', which refers to specific problems with word reading, is a familiar term for Norwegian parents as it is frequently used in schools and media. Moreover, we discussed this term at the welcome meeting with parents.

c. *HLE:* The measure of home literacy was adapted based on previous research (Burgess et al., 2002; Niklas & Schneider, 2013; Torppa et al., 2007): (1) "How many children's books do you have at home?" (1 "None" to 5 "More than 40"). (2) How often do you take your child to a public library? (1 "Never" to 5 "Several times a week"). (3) How old was your child when you first started reading to her or him? (1 "We never read to our child" to 5 "Before the age of two"). (4) How often do you read to your child? (1 "Never" to 5 "Several times a week"). (5-6) How often do fathers/mothers themselves read (a) books and (b) newspapers and magazines (1 "Never" to 5 "Several times a week"). (7) "I only read if I have to" (1 "Disagree completely" to 4 "Agree completely").

For *Study 1*, a three-factor model of the HLE was made by confirmatory factor analysis (CFA) in Mplus 8 (Figure 1). In *Study 2*, the factor score of this HLE model was obtained and saved in Mplus for further analysis.

Emergent literacy skills

Children's preschool emergent literacy skills were tested at the beginning of first grade because first grade is the onset of formal education in Norway.

Letter knowledge: This task consisted of 15 items with multiple-choice questions. For each item, the child was asked to listen to a prerecorded letter sound on the tablet and then respond by pressing one of four letters shown on the touch screen. Cronbach's α = .85.

Phoneme isolation: This task consisted of eight items. For each item, an object was first shown on the tablet screen. The examiner named the object while pointing at it. The child was then asked to produce the first sound of the word. The examiner scored the child's response directly on the tablet. The task was automatically discontinued if a child failed two subsequent items. Cronbach's α = .92.

Blending task: This task consisted of eight items with increasing difficulty. For each item, a set of phonemes forming a word was presented orally by the examiner in the correct order but were pronounced separately. Then, the child was asked to "blend" the phonemes, i.e., put them together to form the corresponding word. The task was automatically discontinued if a child failed two subsequent items. Cronbach's α = .86.

For *Study 1*, a construct of code-related emergent literacy skills was made by CFA

including *Letter knowledge*, *Phoneme isolation* and *Blending task.*

Vocabulary: This test was an abridged version (20 out of 40 words) of the Norwegian vocabulary test (Størksen et al., 2013). A picture appeared on the screen, and the child was asked to name it. Cronbach's α = .83.

In *Study 2*, a construct of emergent literacy was made by CFA using *Letter knowledge*, *Phoneme isolation, Blending task* and *Vocabulary*.

Measures at the end of Grade 2

Word reading 1: This test consisted of 14 items, and the time limit was two minutes. Four orthographically similar words were represented following a picture. The child was asked to read all the words as fast as possible and to tick the word that matched the picture. The test was suspended after two minutes. Cronbach's α = .74.

Word reading 2: This test consisted of 78 sets of four words (word chains) joined together. Students were asked to separate each word from the next by inserting a vertical line after each word that they identified. The time limit was 5 minutes. We provided three practice sets of word chains. The score was the number of correct sets where all four words were correctly identified. Cronbach's α = .84.

For *Study 2*, we used the factor score of these two tests.

Statistical analysis

Structural Equation Modeling (SEM) was conducted in Mplus 8 using a least squares estimator (WLSMV), which is a robust estimator that does not assume a normal distribution and provides the best option for modeling categorical or ordered data (Muthén & Muthén, 2017). CFI, TLI and RMSEA were used for testing of the model fit: for CFI and TLI values equal to or greater than .95 and for RMSEA values equal to or below .05 are preferred (Byrne, 2013).

Results

Descriptive statistics

Study 1: Table 1 shows the descriptive for the whole sample (n=794) and for the groups of children with and without FR, as well as the results of the significance tests of the differences between these two groups. In the group without FR, both the mothers and the fathers reported a higher level of education than those in the FR group. In addition, the group without FR reported significantly richer HLE, in all components. Moreover, children without FR performed significantly higher than those with FR in all three components of code-related emergent literacy skills: letter knowledge, first-

phoneme isolation and blending.

Home Literacy Environment (HLE)															
Children's books in home	794	4.55 (0.74)	1	5		634	4.61 (0.68)	2	5		160	4.32 (0.91)	1	5	*Mann–Whitney U* 42394.50***	.23
Onset of shared reading	794	4.84 (0.45)	2	5		634	4.85 (0.43)	2	5		160	4.77 (0.50)	2	5	*Mann–Whitney U* 46649.00***	.11
Frequency of shared reading	793	4.05 (0.96)	1	5		633	4.09 (0.94)	2	5		160	3.90 (1.02)	1	5	*Mann–Whitney U* 45169.50*	.15
Frequency of library visits with child	788	3.48 (0.75)	1	4		630	3.49 (0.73)	1	4		160	3.43 (0.82)	1	4	*Mann–Whitney U* 48468.00**	.06
Parents own book reading	790	3.34 (1.41)	1	5		631	3.40 (1.39)	1	5		159	3.09 (1.47)	1	5	*Mann–Whitney U* 43976.00**	.19
Parents reading of newspapers and magazines	793	4.79 (0.63)	1	5		634	4.83 (0.55)	1	5		159	4.62 (0.87)	1	5	*Mann–Whitney U* 45909.50***	.13
Parents' interest in reading	790	3.70 (0.67)	1	4		632	3.74 (0.61)	1	4		158	3.54 (0.85)	1	4	*Mann–Whitney U* 41957.50***	.24
Emergent Literacy															
Letter knowledge	794	12.20 (3.30)	0	15		634	12.50 (3.21)	0	15		160	11.01 (3.41)	2	15	*t test:* 234.79 |=| 5.79***	.51
First-phoneme isolation	794	5.61 (2.89)	0	8		634	5.97 (2.70)	0	8		160	4.18 (3.13)	0	8	*t test:* 222.37 =| 6.89***	.61
Blending	794	3.68 (2.65)	0	8		634	3.90 (2.66)	0	8		160	2.81 (2.42)	0	8	*t test):* 264.20 |=| 4.98***	.44

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

[1] *Cohen's d* (Lenhard & Lenhard, 2016); [2]Parents' level of education: 0 = secondary school; 1 = university/college.

Note. This Table is retrieved from Esmaeeli (2022).

Table 1

Parents' education and the HLE measures: descriptive statistics for the whole sample, children with and without FR and the group comparison of means with effect sizes

Study 2: Table 2 presents the descriptive for the whole sample (n=208) and for the groups of children with and without FR, and the results of the significance tests of the differences between these two groups. There were differences in parents' education, *Phoneme Isolation*, *Blending Task*, and both *Word Reading 1* and *2* between children without FR and children with FR (this sample was the sub-sample of the *Study 1*).

	Non-FR ***n* = 159**	**FR** ***n* = 49**	***d***
	M (SD) or %	*M (SD)* or %	
Maternal high education[a] (%)	67.9%	57.1%	-
Paternal high education[a] (%)	59.7%**	40.8%	-
Years in Kindergarten (M, *sd.*)	4.62 (0.74)	4.66 (1.01)	-
Letter Knowledge	12.65 (2.95)	11.78 (2.79)	0.30
Phoneme Isolation	5.73 (2.87)	4.62 (3.06)	**0.37***
Blending	4.04 (2.62)	3.12 (2.58)	**0.35***
Vocabulary	13.60 (3.40)	13.12 (3.49)	0.15
HLE	0.01 (0.18)	-0.04 (.19)	0.01
Word reading 1	11.83 (2.90)	9.84 (3.31)	**0.64***
Word reading 2	12.01 (7.63)	8.30 (6.07)	**0.54***

*$p < .001$ **$p < .05$,

FR, family risk; FR children, children who had one parent with RD; Non-FR children, children with no parents reporting RD; HLE, home literacy environment.

[a]Parents' level of education: high, university/college.

Table 2

Children's characteristic and Means, Standard Deviations, and Group Comparison of Mean

Correlations

Study 1: The correlations between the variables are shown in Table 3. All three factors of the HLE were correlated negatively with both maternal and paternal FR statuses. As expected, these factors of the HLE were also positively associated with maternal and paternal education. In addition, children's preschool code-related emergent literacy skills were negatively correlated with maternal and paternal FR statuses but positively correlated with both maternal and paternal education, and with the three factors of the HLE.

	1.	2.	3.	4.	5.	6.	7.
1. Maternal self-reporting of RD[1]							
2. Paternal self-reporting of RD[1]	0.17*						
3. Maternal education	-0.23*	-0.19*					
4. Paternal education	-0.12*	-0.30*	0.41*				
5. Access to print[2]	-0.33*	-0.35*	0.42*	0.24*			
6. Reading-related activities[2]	0.03	-0.20*	0.21*	0.14*	0.61*		
7. Parents' literacy interest and habits[2]	-0.26*	-0.26*	0.36*	0.25*	0.71*	0.54*	
8. Emergent literacy[2]	-0.41*	-0.31*	0.27*	0.20*	0.42*	0.33*	0.30*

*$p < .001$.

[1]RD = reading difficulties

[2] *Factor Score*

Note. This Table is retrieved from Esmaeeli (2022).

Table 3

Correlation between measures and latent factors for the whole sample

Study 2: Table 4 presents the correlations between the variables. The HLE was correlated with emergent literacy skills, word reading tests, and parents' education but not with FR status.

	1	2	3	4	5	6	7	8	9	
1. FR Status (+)	-									
2. Mother high education	-0.14**	-								
3. Father high education	-0.41**	0.41*	-							
4. HLE	-0.17	0.62**	0.40**	-						
5. Letter knowledge	-0.11	0.18**	0.21**	0.35**	-					
6. Phoneme Isolation	-0.13	0.29**	0.21**	0.48**	0.48**	-				
7. Blending Task	-0.12	0.25**	0.22**	0.42**	0.38**	0.53**	-			
8. Vocabulary	-0.03	0.22**	0.12	0.39**	0.26**	0.44**	0.42**	-		
9. Word Reading 1	-0.28**	0.15*	.040	0.18**	0.25**	0.21**	0.17*	0.09	-	
10. Word Reading 2	-0.22**	0.12	0.18	0.21**	0.27**	0.25**	0.27**	0.13	0.49**	-

*$p < .001$, **$p < .05$.

FR, family risk;Parental level of education: high, university/college; HLE, home literacy environment.

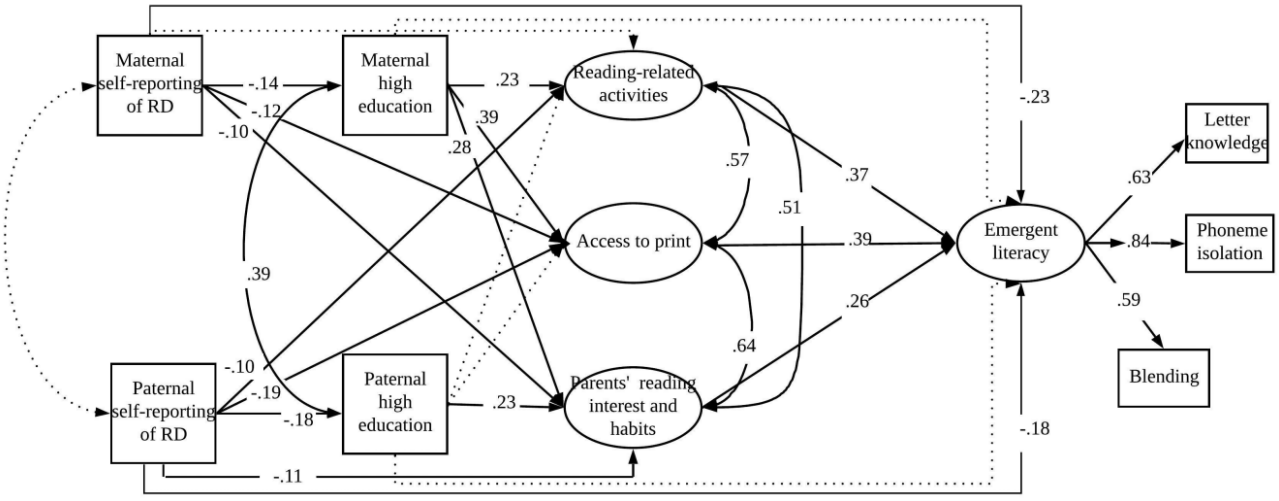
Table 4

Correlation among FR-status, and other variables in the whole sample (N = 208)

HLE and children's preschool code-related emergent literacy skills (*Study 1*)

The aim of *Study 1* was to explore the relation between the three domains of HLE and children's code-related emergent literacy skills and parents' FR statuses while accounting for parents' education in a multifactorial model. Maternal and paternal FR statuses, their education and the three domains of HLE were added as direct and indirect predictors of children's code-related emergent literacy skills (Figure 1). The model fit the data adequately: RMSEA =.023; CFI =.992; TLI =.991.

Figure 1



Note. This model is retrieved from Esmaeeli (2022).

As *Figure 1* shows there is positive association between all the three domains of HLE and children's code-related emergent literacy skills, although both maternal and paternal FR statuses are directly and negatively linked with children's code-related emergent literacy skills. Neither of the indirect paths from parents' FR statuses to children's code-related emergent literacy skills is significant.

HLE, children's preschool emergent literacy skills and later reading skills (*Study 2*)

The *Study 2* aimed *a)* to investigate the association between the HLE and children's emergent literacy skills at the beginning of first grade with reading skill at the end of

second grade, and *b)* to test the protective role of HLE in an extended model by adding the FR status into the former model.

First, parents' education, the HLE and emergent literacy skills were added as direct and indirect predictors of second grade reading skills while controlling for the child's gender and years in kindergarten (Figure 2). This model fit the data adequately (RMSEA =.028; CFI =.993; TLI =.987). Second, this model was extended by adding parents' FR status (Figure 3; The model fit the data adequately: RMSEA =.023; CFI =.995; TLI =.992).

Figure 2

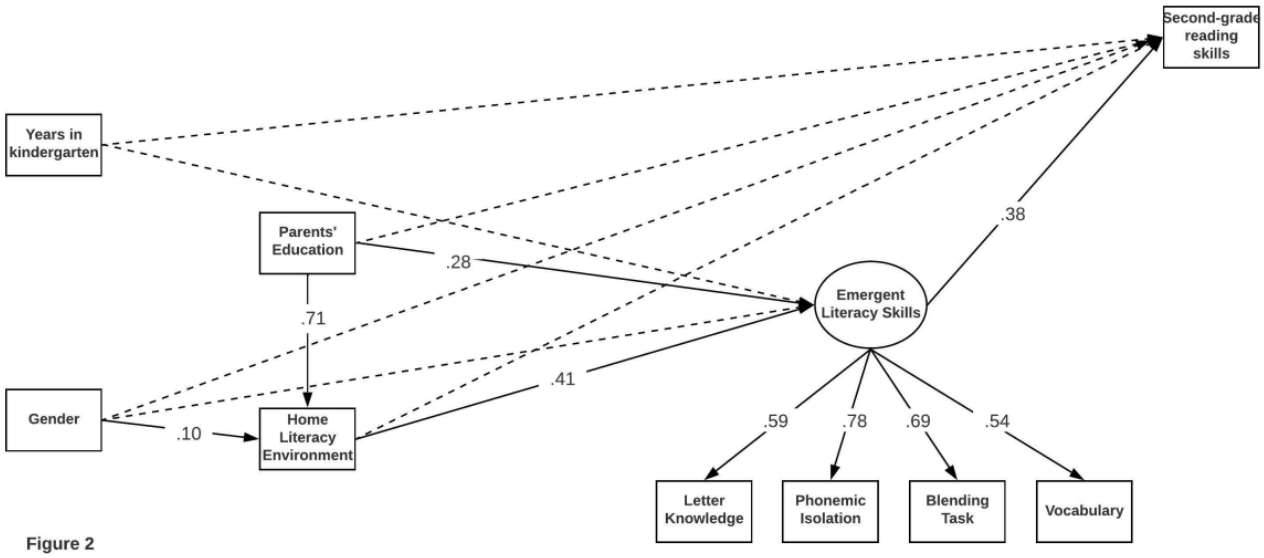


Figure 2

Model 2. Parents' education, the HLE and emergent Literacy in relation to second-grade reading skills while controlling for children's gender and years in the kindregarten

Significant pathway *nonsignificant pathway*

Figure 3

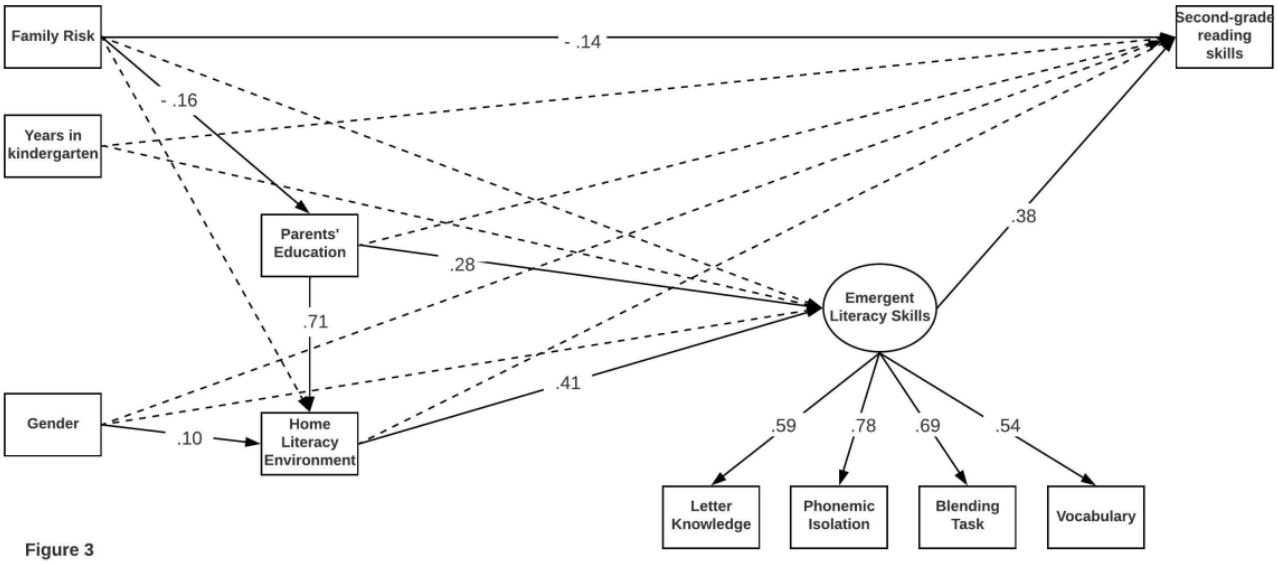


Figure 3

Model 3. Family risk, parents' education, the HLE and emergent Literacy in relation to second-grade reading skills while controlling for children's gender and years in the kindregarten

Significant pathway *nonsignificant pathway*

As shown in *Figure 2* there are positive associations between parents' education, the HLE, children's preschool emergent literacy and their later reading skills at the end of second grade. In addition, all indirect paths from parents' education, the HLE, and emergent literacy skills to second grade reading skills are significant. However, *Figure 3* shows that FR status is directly and negatively linked with both parents' education and children's second grade reading skills but not with the HLE and emergent literacy skills. Further, neither of the indirect paths from FR status to children's emergent literacy skills and second grade reading skills is significant.

Discussion

Overall, the results of both *Study 1* and *2* suggest that investing in parents' involvement as the HLE may impact on the development of children's preschool emergent literacy skills and consequently on their later reading skills at school. These findings will be discussed below.

HLE and children's preschool code-related emergent literacy skills (Study 1)

First, as shown in *Figure 1*, maternal and paternal FR statuses as *risk factors* can impact directly and negatively children's emergent literacy skills including *letter knowledge*, and *phonemic awareness* before onset of reading instruction. The negative associations between FR status and children's preschool emergent literacy skills remain significant even after controlling for the associations between parents' education and the home literacy environment. This means that having a parent with a history of reading difficulties is a risk factor for the development of children's emergent literacy skills long before starting school. These findings indicate that if parents report a history of reading difficulties, we should be concerned about the child's emergent literacy development at early age on.

Second, and more importantly, in this model (*Figure 1*), we can see that the association between the HLE and children's preschool emergent literacy skills is significant and positive while controlling for parents' educational level and the direct and indirect associations between FR statuses. This finding supports the vital and protective role of the home literacy environment in the development of children's preschool emergent literacy skills even in the context of FR, where there is a history of reading difficulties within the family. This means that children's emergent literacy skills can be improved via such a dynamic environmental factor as the HLE, which includes the three domains *reading-related activities* at home (e.g., reading books with or to the child), *access to print* (i.e., how parents exposure the child to the world of reading by providing children's book and reading materials in the household, for example), and *parents' own reading interest and habits* (e.g., parents as a reading role model for the child and how they appreciate reading as a pleasure activity for themselves and their children). In summary, these findings support that the home literacy environment may enhance

children's emergent literacy at an early age, even in the context of family risk of reading difficulties.

Finally, all these three domains of the HLE (*reading-related activities*, *access to print*, and *parents' own reading interest and habits*) are positively related to each other; therefore, they can have impact on each other. This means that parents with higher reading interest and who read for themselves more often, may provide more reading material at home and read more often to their children as well. This finding supports that parents should be encouraged to not only read to and with their children from an early age, and to provide reading material and children's books at home, but also, they should act as role models for reading and talk to their children about how they appreciate reading as a pleasure activity.

HLE, children's preschool emergent literacy and later reading skills (Study 2)

First, the associations between parents' education, the HLE and children's preschool emergent literacy are positively significant in Model 2 (Figure 2). These findings highlight the role of early home literacy environment in children's preschool emergent literacy development, in line with our Study 1. More importantly, the pathway from children's emergent literacy skills to their second grade reading skill is the only pathway that is significant while controlling for the child's gender, the year of kindergarten attendance, their parents' education and the HLE. Furthermore, the indirect pathways from the HLE to children's second grade reading skills is significant as well (HLE → Emergent literacy skills → Second grade reading skills). This finding supports the long-lasting effect of early home literacy environment on children's later reading skills through their preschool emergent literacy skills. Altogether, findings from Model 2 suggest that an enhanced home literacy environment may boost children's preschool emergent literacy skills, which in turn can improve their later reading skills at school. In other words, children's later reading skills can be improved by involving their parents in early promotion program such as home literacy programs that emphasize on providing reading material and children's books at home, reading-related activities and enhancing parents' interest and motivation for such important activities at home.

Second*, Figure 3* shows that when we add FR status (having a parent with reading difficulties) to model 2, family risk and children's preschool emergent literacy skills are the only pathways that directly and negatively link with children's second grade reading while controlling for the child's gender, their years of attendance in kindergarten, parents' education and the HLE. These findings, in line with Study 1, support the vital role of children's preschool emergent literacy development in the context of family risk. In other words, improving children's emergent literacy skills at early age can positively impact on their later reading skills at school even with a history of reading difficulties within the family.

Third, as can be seen in Model 3, family risk is neither associated with the HLE nor with

children's emergent literacy skills when we control for parents' education. Furthermore, neither of the indirect paths from FR status to children's emergent literacy skills and second grade reading skills is significant. A possible interpretation of these findings might be that parents with higher education (independent of having a history of reading difficulties or not) are aware of the important role of reading-related activities at home and consequently provide more reading material for their children and read more often with/to their children.

Finally, the relationships between the HLE, emergent literacy skills and second grade reading skills not only remain positive but somehow are at the same level of strength compared to Model 2. These results, taken together, support that the HLE may have a vital role directly for the development of children's emergent literacy skills, and indirectly for their later reading skills through emergent literacy skills at preschool age. Such dynamic and modifiable environmental factors like an enhanced HLE and involvement of parents in the HLE intervention, can promote children's emergent literacy development at preschool age, and consequently their later reading skills at school.

Implications

Based on the findings from Study 1 and 2, we find that family risk may impact negatively children's preschool emergent literacy development and their literacy outcomes after two years of formal reading instruction. More importantly, we have also identified possible protective factors like the HLE, which is modifiable and can be enhanced by effective intervention programs to improve children's emergent literacy skills at an early age and their later reading skills at school. We suggest that even parents with little education or who have reading difficulties may contribute positively to their children's reading development if these parents enjoy reading with their children. If the parents like reading, they may pass positive attitudes towards leisure reading on to their children and engage their children in shared reading, and thus help them develop better reading skills. Moreover, kindergartens and schools must take on more of the responsibility to help not only children but also their parents to learn how shared reading and reading related activities can be fun and enjoyable. This is particularly true for children from disadvantaged families, and involving families to support their children's literacy development, should be part of any early protection or intervention program.

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