

Chapter 3

3 Facets of Preschoolers' Home Literacy Environments: What Contributes to Reading Literacy in Primary School?

Simone Lehl, Susanne Ebert, and Hans-Guenther Rossbach

Summary

How the family makes early contributions to the acquisition of children's emergent literacy skills and later reading literacy has received increased attention throughout the research literature. Numerous studies have accumulated evidence for the relation between the home literacy environment (HLE) when children are of preschool age (e.g., shared book reading interactions) and children's literacy and language skills. In order to understand how the HLE shapes children's reading literacy before formal schooling actually begins, it is important to examine how specific aspects of the HLE contribute to the development of children's reading literacy. After a short review of the existing research regarding the influence of the HLE on children's reading literacy, the current chapter presents findings from the BiKS-3-10 study. Many studies focus on only one specific aspect of the HLE – mainly, the frequency of shared book reading – at only one time point across the

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preschool period. By contrast, the present study examined the relation between various specific home literacy practices for children of preschool age (book exposure, formal instruction, and the quality of parent-child interactions during shared book reading) and children's reading literacy (basic reading skills and reading comprehension) in elementary school by using different measures (questionnaires and observations) at different measurement points. Results showed that the different aspects of the HLE were significantly related to the different aspects of reading literacy in elementary school. Furthermore, mediation analyses revealed that the effects of the HLE on reading literacy were mediated through emergent literacy skills. The findings underline the importance of the home literacy environment and indicate that research approaches should be strengthened by using multiple measures of the home literacy environment.

Theoretical Background

Reading is known to be one of the most essential competencies that are needed for people to successfully participate in society (OECD, 2003). Although reading is supposed to be acquired via formal instruction in school, we know that children have a lot of experiences with written language before formal schooling begins. Children are surrounded by letters and words in everyday life, beginning with their written name on the front door. They see adults reading newspapers and books and begin to understand that there may be meaning behind the written signs. These kinds of early experiences with written language begin to form the knowledge and skills that are crucial for later reading development. These precursors of later reading are known as emergent literacy (Whitehurst & Lonigan, 1998) and include knowledge of the reading process and of letters, of phonological information processing such as phonological awareness, as well as oral language and linguistic abilities including vocabulary and grammar (see also Ebert & Weinert, chapter 5, this volume). However, what we know so far is that there is a great deal of variability in this knowledge and in these skills and that these individual differences are related to the social backgrounds of the families (Dubowy, Ebert, von Maurice, & Weinert, 2008; Weinert, Ebert, & Dubowy, 2010; Weinert & Ebert, in press).

Presumably one source of variance is comprised of a child's experiences at home and at preschool. For educational research, it is therefore essential to understand the factors in the home learning environment that influence emergent literacy and later reading literacy. Various studies have demonstrated that the home learning environment is associated with children's early literacy and reading development (e.g., Melhuish, et al., 2008; Son & Morrison, 2010; Ebert, et al., 2012; Weinert, Ebert, Lockl, & Kuger, 2012). The most considered variable in this context is the frequency with which parents read to a child (Burgess, Hecht, & Lonigan, 2002). Although a meta-analysis by Bus, van Ijzendoorn, and Pellegrini (1995) showed positive effects of the frequency of reading to a child on emergent literacy (e.g., letter knowledge) as well as on oral language skills (e.g., vocabulary), the amount of explained variance was only moderate (see also Scarborough & Dobrich, 1994). These moderate effects caused some researchers to challenge whether the frequency of reading to a child was suitable or sufficient for explaining interindividual differences in the ability to acquire reading literacy; thus, they suggested extending the concept of the home learning environment (e.g., Burgess, et al., 2002; van Steensel, 2006). In this vein, the following chapter investigates the meaning of different facets of the early home learning environment for later reading literacy.

The Family's Contribution to Reading

The family is the first environment the child encounters and therefore seems to be an important source for children's development. Accordingly, with regard to reading literacy, the early home learning environment – also known as the home literacy environment (HLE) in the research on literacy development – is known to affect the competencies that are necessary for an individual to learn to read in a conventional way; these competencies are called *emergent literacy* (Whitehurst & Lonigan, 1998). Emergent literacy is a term used to describe young children's development with regard to written language (Whitehurst & Lonigan, 1998). An essential aspect of this definition is that this process is continuous and begins long before formal instruction in school begins (Teale & Sulzby, 1989). The skills included in the emergent literacy concept are oral language skills, phonological awareness, knowledge of letters, and perceptions of print (Whitehurst & Lonigan, 1998). All these skills have been shown to

be of great importance for later reading development (e.g., Ebert & Weinert, chapter 5, this volume). Accordingly, the HLE comprises the resources and opportunities the family offers to the child regarding written and oral language (Burgess, et al., 2002). However, there is no well-accepted definition or operationalization of the HLE. This has led to a wide variety of operationalizations of the concept ranging from single-item approaches to as many as 10 different dimensions (Leseman & de Jong, 1998; Britto & Brooks-Gunn, 2001; Umek, Podlesek, & Fekonja, 2005; Gonzalez, et al., 2011;). Sénéchal, LeFevre, Thomas, and Daley (1998) suggested a theory-driven approach that distinguishes between informal and formal literacy activities at home – called the home literacy model. Whereas formal literacy activities at home refer directly to print and are reflected by, for example, teaching the sounds corresponding to certain letters, informal literacy activities refer to experiences that are not focused on print per se but rather on the contents of printed material. These informal experiences are gained specifically through story book exposure. Story book exposure is usually measured by the number of books owned and the amount of time spent reading with or to a child. The authors showed that the two dimensions are distinct from each other as they were not correlated and varied in their prediction of emergent literacy skills. The home literacy model provides specific assumptions concerning the relation that each dimension has to the development of reading literacy.

Formal literacy experiences at home

Formal literacy experiences are assumed to foster reading skills, such as word decoding, which occurs through the fostering of early letter knowledge and early word reading skills (Sénéchal & LeFevre, 2002). Formal literacy experiences are most often measured by having a child state the alphabet, write his or her own name, and read simple words. Such formal experiences have been shown to be associated with letter knowledge (Evans, Shaw, & Bell, 2000; Torppa, Poikkeus, Laakos, Eklund, & Lyytinen, 2006; Manolitsis, Georgiou, Stephenson, & Parrila, 2009; Lehl, Ebert, Rossbach, & Weinert, 2012) and word decoding skills (Sénéchal & LeFevre, 2002; Hood, Conlon, & Andrews, 2008). Lehl and colleagues (2012), for example, found that the (self-reported) frequency with which parents taught their child to read and to recite the alphabet at the age of 3 years predicted letter knowledge at the age of 6, even when

earlier language competencies were controlled. Similarly, Torppa and colleagues (2006) found that the frequency with which parents taught letter names when their child was 4.5 years old predicted the child's letter knowledge at the age of 6. Other studies have even shown that such formal activities also have substantial effects on later, more advanced reading skills (see Scarborough & Dobrich, 1994, for a review; Evans, et al., 2000; Sénéchal & LeFevre, 2002; Whitehurst & Lonigan, 2003; Sénéchal, 2006; Stephenson, Parrila, Georgiou, & Kirby, 2008). For example, in an English-speaking sample, Sénéchal and LeFevre (2002) demonstrated that parental reports of how often they taught reading and writing to their kindergarten-aged children were indirectly linked to word reading skills in Grade 1 through emergent literacy skills. In the same manner, parental reports of how often they taught literacy skills were also related to word reading skills in Grade 3. The same was true for a French-speaking sample (Sénéchal, 2006). However, no such effects were found in a Greek sample by Manolitsis et al. (2011) or in a Finnish sample by Leppänen, Niemi, Aunola, & Nurmi (2004). These findings suggest different effects for different languages, depending on their orthographical transparency (i.e., the extent to which graphemes have multiple pronunciations and phonemes have multiple spellings; Manolitsis, et al., 2009). Presumably the teaching of the sounds of letters before formal schooling begins is especially important for children who are learning written languages that are orthographically less transparent (e.g., French, English) and when reading acquisition is more difficult (Georgiou, et al., 2008). As German is an orthographically transparent language, we assume that the effects of formal teaching might be low or even absent with regard to reading literacy.

Informal literacy experience at home

According to the home literacy model, informal literacy experiences are assumed to promote language skills, especially vocabulary, and in accordance, these language skills then promote early reading literacy. As Sénéchal's (2006) study focused on more advanced reading skills, her findings suggest indirect effects of informal literacy experiences via vocabulary on reading comprehension. Book exposure and shared book reading in particular can be seen as the prototypical aspect of informal literacy experience. In the context of shared book reading, children are exposed to oral

language, print, and literacy concepts (Sénéchal & LeFevre, 2001). The importance of shared book reading has been investigated a lot and has consistently shown positive effects on language and literacy skills (i.e., children's vocabulary development, phonemic skills, print concept knowledge, and positive attitudes toward literacy; Dickinson & Tabors, 1991; DeBaryshe, 1993; Wagner, Torgesen & Rashotte, 1994; Sénéchal, LeFevre, Hudson, & Lawson, 1996; Lyytinen, Laasko, & Poikkeus, 1998; Raikes, et al., 2006). The meta-analysis by Bus et al. (1995) indicated that the amount of shared book reading was related to children's language skills, emergent literacy skills, and reading skills (see also Scarborough & Dobrich 1994). Additionally, some results have indicated that the number of picture books in a home is positively associated with children's language and reading skills (e.g., Payne, Whitehurst, & Angell, 1994; Sénéchal, et al., 1996; Sénéchal, et al., 1998). As these aspects cover the frequency of shared book reading and number of books, this dimension could be titled *quantity* of book exposure.

When thinking about how book exposure contributes to children's literacy development, a social-constructionist perspective suggests that books are a source from which children can acquire literacy skills while being supported by a more experienced person (Vygotsky, 1969). Consequently, it is assumed that children become interested in books, expand their vocabulary, and acquire other emergent literacy skills through the social interaction that occurs during the shared reading experience. Young children may profit from the guidance of an experienced reader with regard to understanding the meaning behind the print (Snow, Burns, & Griffin, 1998). Thereby, book reading seems to be most effective when parents actively involve their child in the reading situation by asking open-ended questions (Ninio, 1983), discussing the story, and elaborating on the child's comments in verbal exchanges (de Jong & Leseman, 2001). This assumption is also supported by research that has investigated the effects of reading interventions. The benefit of a reading intervention that emphasizes the interactive style of reading on young children's language skills was demonstrated first by Whitehurst and his colleagues (1988). The so-called Dialogic Reading Program was designed to encourage the parents of 2- and 3-year-old children to use evocative techniques that encourage the child's active participation in telling the story by asking questions and by using expansions, corrections, and praise to give the child feedback

(Arnold & Whitehurst, 1994). Furthermore, a meta-analysis by the Early Literacy Council showed higher effect sizes for child reading outcomes in interventions that were designed to include the child in an interactive way in the reading situation than in interventions with less emphasis on the interactive involvement of the child (Shanahan & Lonigan, 2010). These findings support the idea that, in addition to examining the *quantity* of book exposure, researchers should also examine parent-child interactions while book reading. Thus, the *quality* of book exposure can be seen as a second informal dimension of the HLE. Lehl and colleagues (2012) showed that the quality of parent-child interactions in a shared book reading situation (e.g., asking open-ended questions and using complex language) measured when the children were about 3 years of age, explained unique variance in the growth of the children's vocabulary in the next year, whereas the quantity of book exposure explained unique variance in the growth of grammatical knowledge in the same time period. Similar findings regarding the differential effects of the quantity and quality of book exposure can be found in a Dutch study conducted by Leseman and de Jong (1998). They reported that the quality of instruction while sharing a book with a preschooler was positively associated with vocabulary development at the age of 7, whereas the aspect that reflected quantity – literacy opportunity – was not.

In summary, a distinction between formal and informal dimensions of the HLE as assumed by the home literacy model is consistent with research findings from different samples. However, an extension of a further informal dimension that refers to the quality of parent-child interactions seems to be necessary. In light of this and to provide an extension to Sénéchal and LeFevre (2002), the current study accordingly distinguished between three dimensions of the HLE: formal instruction in literacy, book exposure (quantity), and the quality of parent-child interactions. Lehl and colleagues (2012) showed that each dimension was associated with different emergent literacy outcomes at the age of 4 years. The present study extended these findings by focusing on the same children at an older age and by employing reading literacy outcome measures. The main question was whether the three facets of the HLE would also have differential effects on reading literacy. Thereby, our study differentiated between different aspects of reading literacy. This approach is theoretically driven by Snow's (1991, 1999) componential model of literacy development in school. This

model suggests that basic reading skills such as word decoding or reading speed and reading comprehension comprise two different but interrelated facets of reading literacy that are determined by different environmental and cognitive preconditions (see also Scarborough, 2001; Richter & Christmann, 2002; Storch & Whitehurst, 2002). Of course, the two dimensions are interrelated as at least a minimum of basic reading skills are necessary for reading comprehension (Hoover & Gough, 1990). According to the model, basic reading skills are determined in particular by code-related emergent literacy skills such as letter knowledge and phoneme awareness. These in turn are assumed to be fostered by home literacy experiences that are focused directly on teaching the alphabet and print-related skills. By contrast, reading comprehension will be specifically affected by children's vocabulary, world knowledge, and pragmatic skills, which in turn are assumed to be predicted by informal literacy experiences such as story book exposure. Against this background, the current study addressed the following questions:

- 1) Does each aspect of the HLE explain unique variance in children's reading literacy beyond the others?
- 2) Do the various aspects of the HLE have a different impact on reading comprehension in comparison to basic reading skills?
- 3) Are the effects of the HLE mediated by emergent literacy skills at the end of preschool?

Method

Procedure and Sample

All data for the present study were drawn from the BiKS-3-10 substudy (see also Lorenz, Schmitt, Lehl, Mudiappa, & Rossbach, chapter 1, this volume). At the first measurement point in autumn 2005, a sample of 547 children (about 3 years old) attending 97 preschools in two German federal states (Hesse and Bavaria) participated. Data collection took place in half- or 1-year intervals and contained a wide range of data on child and family characteristics as well as data on their learning environments at home, in the preschools, and in the primary schools.

The present study focuses on children's reading literacy in the second grade of primary school. Because not all children could be followed over such a long period of time, the sample size was reduced to 343 children for whom at least one outcome measure in reading literacy in Grade 2 was available. The average age of the children was 8.2 years ($SD = 0.33$) in Grade 2. Furthermore, the gender of the children was nearly equally distributed; 48.4% were male and 51.6% were female.

Measures

Reading literacy. Reading literacy was assessed using a test that measures basic reading skills, specifically reading speed, as well as a test of reading comprehension. Both tests were administered in the second grade of primary school when the children were about 7 years old.

Basic reading skills. The SLS 1-4 (Salzburger Lese-Screening fuer die Klassenstufen 1-4; Mayringer & Wimmer, 2003; parallel test reliability $> .90$) assesses reading speed as a measure of basic reading skills. It consists of a list of 70 short simple statements (e.g., "Bananas are blue"), and children have to read as many sentences as possible in 3 min. Thereby, children have to mark whether the statements, ordered by increasing length, are true or false. The dependent variable is the sum of the correctly classified sentences ($M = 32$, $SD = 10$).

Reading comprehension. To assess reading comprehension, the subtest "text comprehension" of the ELFE 1-6 (Ein Leseverstaendnistest fuer Erst- bis Sechstklaessler; Lenhard & Schneider, 2005; retest reliability $r > .90$) was administered. For this subtest, students have to read 20 short passages on various topics, mainly of everyday life, and then have to answer comprehension questions in a multiple-choice format. The dependent variable is the sum of the correct responses ($M = 10$, $SD = 4$).

Emergent literacy. All emergent literacy competencies were measured in the final year of preschool when children were about 5 years of age. For this study, we focused on children's receptive vocabulary, receptive grammar, and letter knowledge.

Receptive vocabulary. To assess children's receptive vocabulary, a German research version of the Peabody Picture Vocabulary Test (PPVT; Dunn & Dunn, 1981) was used. For each item, the child was required to choose the picture that represented a verbally

given word out of four alternatives. The test had 175 items of increasing difficulty. Testing was stopped when six or more items within a set of 12 items were answered incorrectly. The indicator for receptive vocabulary consisted of the sum score of all correct items ($M = 80, SD = 21$).

Receptive grammar. A shortened German Version of the Test for the Reception of Grammar (TROG; Bishop, 1989; German Version TROG-D, Fox, 2006) was used. The test consists of 48 items ordered in sets of four or two items and requires the child to select the picture that corresponds to a given sentence (out of four alternatives). Testing was stopped when children answered five succeeding sets incorrectly (a set was counted as incorrect when at least one item of a set was answered incorrectly). The sum score of all correct items was used to build an indicator for receptive grammar ($M = 37, SD = 5$).

Letter knowledge. Children were exposed to the 26 letters of the German alphabet in five or six letter groupings depicted on cards (20 x 15 cm). Letters had a height of 2 cm and were grouped together incidentally. We ensured that no letter was followed by the letter that immediately followed it in the alphabet. On each picture card, the children were asked to name the letters they knew. The formal as well as the phonemically correct pronunciation were scored as correct answers. The sum of all correctly named letters was used in the analyses ($M = 13, SD = 8$).

The Home Literacy Environment and family background

The Home Literacy Environment (HLE). The HLE was measured in the first, second, and third year of preschool education. According to our research question, we differentiated between three facets of the HLE (formal instruction, book exposure, and the quality of parent-child interactions). Each measure was calculated by taking the mean of the three yearly measurement occasions.

Formal instruction. Parents were asked to report the frequency with which they taught their child to read and to recite the alphabet on a 4 point scale (1 = *never*, and 4 = *very often*). Both items were taken out of the Home Observation for Measurement of the Environment (HOME; Caldwell & Bradley 1984): “The child is encouraged to learn to read a few words.”, “The child is encouraged to learn the alphabet.”. The correlation

between the two items at each measurement occasion was $r = .77$, $r = .72$, and $r = .71$, respectively.

Book exposure. Book exposure was measured via the answers the parents gave in a questionnaire regarding how frequently they read to the child (1 = *never*, and 5 = *daily*), the number of books in the household, and the number of children's books in the household. Regarding the books in the household, categories ranged from 1 = *up to 30*, 2 = *up to 100*, 3 = *up to 200*, and 4 = *more than 200 books*. The categories for children's books ranged from 1 = *up to 10*, 2 = *up to 20*, 3 = *up to 30*, and 4 = *more than 30 books*. In order to represent one scale, before taking the means of the items, the items were first standardized. Cronbach's alpha for each measurement occasion was .68, .67, and .70, respectively.

Quality of parent-child interactions. The Family Rating Scale (Familieneinschaetzskala (FES); Kuger, Pflieger, & Rossbach 2005), developed in the context of the BiKS study, was used to measure the quality of parent-child interactions during a semi-standardized book reading task between the primary caregiver (96% were mothers) and the child. The book provided by the research team was not commercial and therefore unknown to all of the parents. The interaction between parent and child was rated on 11 general and domain-specific aspects of interaction quality (1 = *low quality* to 7 = *high quality*) by trained observers. As a measure of the quality of parent-child interactions in the present study, the following items were used: use of questions when interacting, quality of oral language, verbal distancing, nonverbal behavior, participation in dialogue, and use of phonological cues. Cronbach's alpha for each measurement occasion was .65, .75, and .77, respectively.

Native language background. Parents were asked what their first language was. In 17.2% of the families in the present subsample, at least one parent indicated a mother tongue other than German.

Socioeconomic status of the family (SES). SES was measured using the International Socioeconomic Index of Occupational Status (ISEI; Ganzeboom & Treiman, 1996). The highest value (HISEI) of each family was used in the analyses (range: 16 - 90; $M = 53.1$; $SD = 16.1$).

Statistical Analyses

To examine the impact of the home learning environment on children's reading literacy, path models were run. To answer the first two research questions regarding the impact of the various measures of the HLE on reading literacy, a test of a path model involving the two outcome measures (basic reading skills and reading comprehension) was conducted (see Figure 1).

According to the theoretical background, we expected effects of the HLE on emergent literacy skills, which were then, according to the home literacy model, expected to predict reading literacy. In order to answer our third research question regarding whether the effects of the HLE would be mediated through emergent literacy skills, an additional path model was specified including the variables vocabulary, grammar, and letter knowledge as indicators of emergent literacy in the final preschool year. This made it possible to test for indirect effects of the HLE on reading literacy through emergent literacy competencies. A full mediation model (without direct paths) as well as a partial mediation model (allowing direct paths) was tested. The chi-square difference test was used to find the best-fitting solution, which is displayed in Figure 2.

Mplus version 6.0 (Muthén & Muthén, 1998-2010) was used for all analyses. Model fit was evaluated by the chi-square test, RMSEA, SRMR, and CFI, as recommended by Hu and Bentler (1999). The amount of missing data for the single predictors of interest in the sample was very small (9.4% on average; ranging from 0% to 27.7%). In an attempt to avoid introducing bias into the sample through listwise deletion (Little & Rubin, 1987), the full-information maximum likelihood (FIML) approach (Arbuckle, 1996), which includes valid information for all observations for model estimation, was used to deal with missing data.

Results

Relations between the HLE and Reading Literacy

Table 1 displays the bivariate correlations between the HLE measures and reading literacy. The results indicated significant relations between the HLE and reading literacy. The correlations supported the proposed pattern that formal instruction would

be associated with basic reading skills ($r = .16$), whereas reading comprehension was more strongly correlated with the informal dimensions: the quality of parent-child interactions ($r = .20, p < .05$) and book exposure ($r = .21, p < .05$).

Table 1. Correlations between Background Variables, HLE, Emergent Literacy, and Reading Literacy

	1.	2.	3.	4.	5.	6.	7.	8.	9.
1. Reading comprehension									
2. Basic reading skills	.78**	-							
3. HLE interaction quality	.20**	.02	-						
4. HLE book exposure	.21**	.24**	.26**	-					
5. HLE formal instruction	.07	.16*	.09	.00	-				
6. Vocabulary	.36**	.16*	.30**	.27**	-.04	-			
7. Grammar	.36**	.21**	.32**	.31**	-.08	.62**	-		
8. Letter knowledge	.41**	.39**	.01	.06	.29**	.18*	.10	-	
9. SES	.17*	.22**	.33**	.41**	-.11	.39**	.36**	.16**	-
10. Native language background	-.12#	-.10#	-.30**	-.16*	.10	-.46**	-.33**	.05	-.19*

Note. Language background: 0 = both parents German, 1 = one parent not German.

SES = socio-economic status.

$p < .10$. * $p < .05$. ** $p < .01$.

As mentioned earlier, theory suggests that basic reading skills are a necessary prerequisite for reading comprehension. Thus, in the path model, the variable “basic reading skills” was regressed on the variable reading comprehension. Furthermore, all background and HLE variables were regressed on the outcome measures. The predictor variables were allowed to correlate. The resulting path model (see Figure 1) tested whether and what impact literacy experiences at home in the preschool years have on reading literacy in the second grade of primary school, when considered simultaneously. It demonstrated that, while controlling for background variables, story book exposure was significantly associated with reading comprehension, even after controlling for basic reading skills ($\beta = .09, p < .10$).

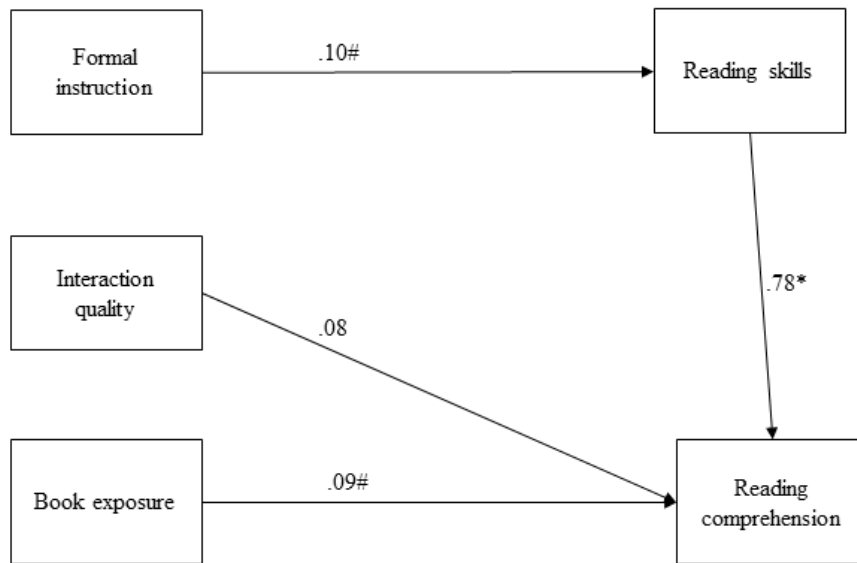


Figure 1. The relation between facets of the home literacy environment and reading literacy. *Note.* $N = 343$, $\chi^2(df) = 2.57(3)$, $p = .46$, $CFI = 1.00$, $RMSEA = .00$, $p = .75$, $SRMR = .01$. SES and native language background were controlled in the path model. # $p < .10$. * $p < .05$.

Against our expectations, the other informal facet of the HLE, the quality of parent-child interactions, did not explain significant unique variance in reading comprehension ($\beta = .08$, *ns*). However, as expected, parents' formal instruction had no significant effect on reading comprehension, but had a marginally significant effect on basic reading skills ($\beta = .10$, $p < .10$). Furthermore, neither story book exposure nor the quality of interactions predicted basic reading skills. We also found that there was a strong association between basic reading skills and reading comprehension ($\beta = .78$, $p < .01$). The explained variance for reading comprehension was correspondingly high ($R^2 = .61$) and comparatively low for basic reading skills ($R^2 = .07$). Thus, the direct effects of the HLE on reading literacy were relatively small.

Indirect Effects of the HLE via Emergent Literacy

In a second step, a path model that predicted emergent literacy skills was specified to ascertain whether early language competencies would mediate the effects of the HLE on reading literacy. Concerning the effects from the HLE on emergent literacy, we specified the paths according to the theoretical assumptions. Thus, a path leading from formal instruction to letter knowledge was specified. Furthermore, paths leading from

book exposure to vocabulary and grammar were specified as well as paths leading from the quality of interactions to vocabulary and grammar. Additionally, paths were specified leading from preschool skills to both measures of reading literacy from Grade 2 (i.e., reading comprehension and basic reading skills).

As our focus was on the direct and indirect links between the HLE measures and reading literacy, a first model that allowed only indirect effects (full mediation) was compared to a second model that also allowed direct effects (partial mediation). In the partial mediation model, none of the direct effects were significant. Accordingly, the full mediation model did not show a worse fit than the partial mediation model as the chi-square difference test demonstrated ($\Delta\chi^2 = 6.8$, $df = 3$, $p = .08$). Thus, the full mediation model as the more parsimonious was preferred. Figure 2 shows all significant indirect effects in this model with bolt arrows.

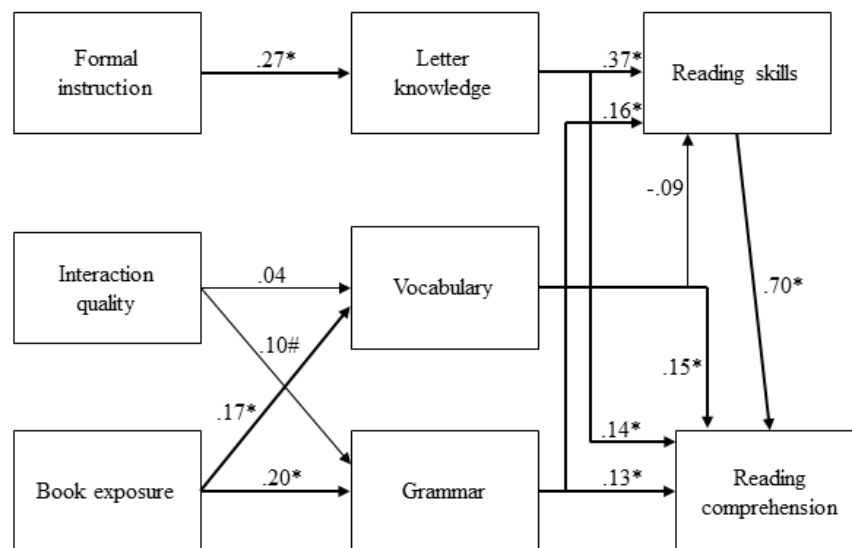


Figure 2. The relation between facets of the home literacy environment and reading literacy including mediating variables (i.e., vocabulary, grammar, and letter knowledge). *Note.* $N = 343$; $\chi^2(df) = 8.53(10)$, $p = .57$, $CFI = 1.00$, $RMSEA = .00$, $p = .94$, $SRMR = .02$. SES and native language background were controlled in the path model. # $p < .10$. * $p < .05$.

Concerning basic reading skills, the effect of formal instruction was completely mediated through letter knowledge (indirect effect: $\beta = .10$, $p < .05$). Additionally, the indirect effect of book exposure through grammar ($\beta = .03$, $p < .10$) on basic reading

skills was significant. However, there was no significant indirect effect on basic reading skills through vocabulary ($\beta = -.02$, *ns*). Furthermore, no indirect effects of the quality of interactions were found on basic reading skills through vocabulary ($\beta = -.00$, *ns*) or through grammar ($\beta = -.02$, *ns*).

The indirect paths representing the effects of book exposure on reading comprehension – controlling for basic reading skills – through grammar ($\beta = .03$, $p < .05$) and vocabulary ($\beta = .03$, $p < .05$) were significant. An additional indirect effect of book exposure was found through grammar and basic reading skills ($\beta = .02$, $p < .10$). The other hypothesized indirect path leading from book exposure through vocabulary and basic reading skills to reading comprehension was not significant ($\beta = -.01$, *ns*). The same was true for interaction quality where no indirect path approached significance. Surprisingly, the formal instruction of the parents showed a significant indirect effect via letter knowledge ($\beta = .04$, $p < .05$), although there was no association between formal instruction and reading comprehension in the model without the mediating variable letter knowledge (see Zhao, Lynch & Chen, 2010, for a discussion on testing mediation when no zero-order correlation exists). The variable letter knowledge therefore seemed to act as a suppressor variable that cloaked the relation between reading comprehension and formal instruction. Furthermore, the indirect path leading from formal instruction through letter knowledge and basic reading skills was significant as well ($\beta = .07$, $p < .05$) and even higher than the effect that went through only letter knowledge.

Discussion

In the present longitudinal study, the complex relations between preschoolers' home literacy environments, developing literacy skills, and reading literacy in Grade 2 were examined. Three measures of the early home learning environment representing formal and informal stimulation at home – formal instruction, book exposure, and the quality of parent-child interactions as well as different measures of reading literacy in Grade 2 (i.e., basic reading skills and reading comprehension) were investigated. Furthermore, selected emergent literacy competencies (i.e., grammar, vocabulary, and letter knowledge) were taken into account. The main results of the study are: There are relations between the early home learning environment and reading literacy in

Grade 2. These effects are (a) different when considering the different dimensions of the home learning environment, (b) different for basic reading skills and reading comprehension, and (c) mediated through emergent literacy skills in preschool.

The first aim of the study was to examine the contributions of different aspects of the HLE on basic reading skills and reading comprehension. Our findings are in line with previous studies and extend them by showing that formal instruction by the parents such as the explicit teaching of reading-related skills was associated not just with decoding skills (Sénéchal & LeFevre, 2002; Sénéchal, 2006; Manolitsis, et al., 2009) but also with basic reading skills. Experiences that included informal interactions with print on a more global level such as reading to the child and having a lot of books appropriate for both children and adults were associated with reading comprehension (Leseman & de Jong, 1998; de Jong & Leseman 2001; Sénéchal, 2006). Also consistent with previous findings, most of the effects could be attributed to the effects of the HLE on emergent literacy competencies (i.e., letter knowledge, vocabulary, and grammar in the final year of preschool). This had an effect on reading literacy in particular when parents indicated that they frequently taught the alphabet and frequently had their children read simple words. This effect was mediated through letter knowledge for both basic reading skills and reading comprehension. Nevertheless, the effect of formal instruction via letter knowledge was stronger for basic reading skills than for reading comprehension. From a theoretical point of view, the results correspond to the home literacy model as well as Snow's (1991, 1999) two-trajectory model of literacy development in school. The specific relation found in the present study between formal instruction in the home and basic reading skills in the second grade via letter knowledge in preschool is in line with the model as it suggests that code-related skills will be specifically affected by home literacy experiences that refer to print. The present study demonstrates that basic reading skills that are more focused on reading speed and less on decoding are also affected by home literacy experiences that refer to print. The importance of letter knowledge for reading comprehension may reflect the idea that even in the second year of formal reading instruction, reading comprehension demands a lot of basic reading skills (Perfetti, 1985; see also Ebert & Weinert, chapter 5, this volume). This concept is demonstrated by the strong correlations between basic reading skills and reading comprehension. However, the present study modelled basic

reading skills and reading comprehension simultaneously under the assumption that reading comprehension is directly influenced by basic reading skills. Nevertheless, the indirect effect of formal instruction on reading comprehension via letter knowledge remains, even when controlling for basic reading skills. Thus, formal instruction by an experienced other has an effect through letter knowledge on reading comprehension over and above basic reading skills. Reasons for why letter knowledge is such a crucial skill in reading development has been summarized by Foulin (2005), who states: “[...] LNK [letter-name knowledge] may set prereaders on the right path towards conventional alphabetical literacy” (p. 136). To summarize, formal instruction with regard to letters by the parents could help the child to get to know the letters earlier and seems to boost their reading literacy. As Sénéchal and LeFevre (2002) pointed out, the exposure to books may not be sufficient to foster the specific literacy skill of letter knowledge. However, according to their model, book exposure as an informal source of stimulation should be more relevant for language-related skills such as vocabulary and grammar and hence for later reading comprehension. These assumptions were also confirmed in our study.

Book exposure affects preschool children’s vocabulary and grammar and in turn affects reading comprehension. Furthermore, book exposure is important for developing basic reading skills through grammar. The explanation for the finding that book exposure has an effect on vocabulary, grammar, and reading comprehension seems to come from the complexity of the language the parents use while reading compared to just talking: Mason and Allen (1986), for example, showed that children are exposed to more linguistically complex sentences when someone reads to them. Additionally, the results of Crain-Thoreson, Dahlin, & Powell (2001) indicate that the mean length of utterances is longer when an adult reads to a child. Third, Stanovich and West (1989) showed that the frequency with which a child is read to goes along with more complex oral language use. All in all, children seem to acquire an extended receptive vocabulary and receive a better understanding of the structure of grammar when they are exposed to books. In the same vein, a more sophisticated sentence understanding and better grammar knowledge should lead to better basic reading skills as well. However, one has to keep in mind that basic reading skills were measured through reading speed in the present study.

The present study was able to tie in with the assumptions made by the second trajectory of Snow's (1991, 1999) two-trajectory model of literacy development in school. This second trajectory – reading comprehension – is specifically affected by children's language-related skills of vocabulary and grammar, which in turn are predicted by the informal literacy experience of story book exposure.

In addition to book exposure and as an expansion of Sénéchal et al.'s (1998) model, we considered a second informal source of reading stimulation: The quality of parent-child interactions during book reading. In contrast to our expectations, we did not find direct or indirect effects of interaction quality on reading literacy. However, one has to keep in mind that these effects can be interpreted as effects that are over and above the effects of book exposure and formal instruction as these effects are all modelled simultaneously. In contrast to Lehl et al. (2012), who found an effect of interaction quality on children's receptive vocabulary in the first year of preschool, the results of the present study did not replicate this effect for children's linguistic skills at the end of preschool. This lack of effect on emergent literacy skills leads to the lack of effect of interaction quality on reading literacy. It seems that the quality of the interaction in a shared book reading situation – measured by the FES – becomes less important when children get older. But because interaction quality affects earlier language development (Lehl, et al., 2012), it may also boost reading comprehension through autoregressive effects of vocabulary development. Leseman and de Jong (1998) also found a slightly higher effect of literacy opportunity (comparable to our book exposure scale) for the vocabulary of children at the age of 4 (which is the last year of preschool in the Netherlands), than for instruction quality (comparable to our interaction quality scale). As the child's age increases, the overall exposure to books may become more important than the manner in which an adult reads with the child as measured by the FES.

Based on the assumption that later reading skills are determined by the two components (i.e., code-related and language-related skills), parents have several opportunities to support their children: They can assist their children's language competencies through the informal encouragement of interacting with their child while reading (e.g., through asking open-ended questions or providing experiences

with books), or they can facilitate code-related skills through the formal teaching of written letters.

Limitations

In spite of the present study's several strengths, such as the longitudinal and multimethod design, the study has some limitations: First, the present study did not consider the effects of the preschool environment. One might argue that parents from a specific advantaged background might select higher quality preschools for their children. As a consequence, improved literacy skills might be traced back to better preschool quality instead of a better HLE. Accordingly, all analyses were also computed while controlling for preschool quality. The effects of the HLE are the same for all outcome variables and can be requested from the corresponding author. Second, book exposure and formal instruction are based on parents' self-reports, which might be affected by social desirability. However, if that was the case, one might expect higher correlations between the two scales. We therefore conclude that social desirability most likely did not cause large measurement error in the present study. Another limitation refers to the fact that because of the design of our study, only children with preschool experience participated in our study. Thus, future research will have to cross-validate the findings by using samples that additionally include children who do not attend preschool.

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