

The Sooner, the Better: Early Reading to Children

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Abstract

As reading to children plays an important role in language development, primary caregivers are often encouraged to read to their children from a very young age. However, little is known about the age at which such reading should start. The linguistic skills of 104 children were assessed shortly before school entry. Their parents were asked how old their children were when they first read to them and how often they had read to their children. Almost half of the study children were read to before they were 6 months old. The age at which children were first read to was closely associated with family characteristics such as socioeconomic status, the frequency with which children were read to as preschoolers, and with children's linguistic and cognitive competencies. The findings imply that reading books to very young children indeed contributes meaningfully to a favorable home literacy environment and supports children's language development.

Keywords

storybook reading, onset of reading to a child, home literacy environment (HLE), parent–child interactions, linguistic competencies

Introduction

Children's language and literacy competence does not begin when children enter school—Children's literacy learning starts well before formal schooling, and studies have shown that children are sensitive to speech even prenatally (e.g., Moon, Lagercrantz, & Kuhl, 2013; Partanen et al., 2013). Parents and primary caregivers (subsequently referred to as parents) are highly influential in a child's early learning as parent–child interactions are frequent and ongoing. Indeed, research shows that the home literacy environment (HLE) is the context in which children first acquire the language and literacy skills that equip them to make sense of, describe, and participate in the world (e.g., Liebeskind, Piotrowski, Lapierre, & Linebarger, 2014; Niklas & Schneider, 2013; Raikes et al., 2006).

Bronfenbrenner's (1979) ecological theory offers a theoretical framework for the influence of the HLE on child development. According to Bronfenbrenner, children belong to a complex and evolving social and cultural ecology. His theory posits that distal elements of a child's ecological system such as extended family, community, and society have some impact on children, but proximal factors such as a child's immediate family have the most influence on a child's development. Similarly, distal family characteristics such as family socioeconomic status (SES) based on income, occupation, or education and family migration background are far less influential than proximal family characteristics such as

parent–child interactions (Farrant & Zubrick, 2012; Niklas, 2015; Niklas, Möllers, & Schneider, 2013).

Other theoretical frameworks relevant to a discussion of the influence of the HLE include Vygotsky's (1978) social constructivist theory and Bourdieu's (1986) social theory. According to Vygotsky, children learn through observation and interaction with knowledgeable others in social contexts. In the context of language and literacy learning, the importance of parents modeling literacy activities and supporting their children's emerging literacy skills is clear. Bourdieu theorized that the cultural capital to which an individual or a family has access is a key component of the HLE. This cultural capital includes cultural objects and resources such as books and works of art, as well as the ability to utilize and learn from such objects and resources. Consequently, a family's cultural practices such as reading and writing are closely associated with the family's cultural capital.

The multifaceted HLE incorporates various literacy-related activities such as parental reading behavior, library visits, teaching of letters and sounds, and owning books at home (Niklas, 2015). However, reading to children is a core

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element of the HLE (Bus, van IJzendoorn, & Pellegrini, 1995; Niklas, Nguyen, Cloney, Tayler, & Adams, 2016). Many studies have focused on the impact that reading to children has on children's linguistic competencies (e.g., Edwards, 2014; Raikes et al., 2006), but little is known about the age at which parents should start reading to their children, whether the age of first reading predicts the frequency with which a child is read to later on, or whether the age of first reading predicts children's competencies as preschoolers (e.g., DeBaryshe, 1993).

In this study, parents were asked how old their child was when first read to. This first-reading age was then tested to explore its relationship with various child outcomes shortly prior to school entry.

Early Linguistic Development

The ability to read and write letters, with comprehension, is the basis for success in formal education. Adults who show greater literacy competencies often earn higher incomes, have better job prospects, lower risk of mental illness, and enjoy better health (Fawcett, 2003; Lyon, 2002). However, no clear-cut borders exist between the precursors of reading and spelling, such as children's vocabulary and phonological awareness, and children's later reading and spelling skills (Bowman, Donovan, & Burns, 2003; Schatschneider, Fletcher, Francis, Carlson, & Foorman, 2004; Torgesen, 2002; Torppa et al., 2007). Oral language skills such as vocabulary and code-related skills such as phonological awareness are interrelated domains of emergent literacy. Consequently, the early ability to understand language and to use or manipulate language expressively is very important (Whitehurst & Lonigan, 1998). Understanding the initial stages of linguistic development and identifying aspects of early literacy experiences that support children's later reading proficiency present opportunities to have a positive impact on early linguistic skills of very young children.

As language and literacy experiences in the first three years of life set the scene for children's later literacy competencies, these experiences are critical. Passive listening and nonverbal communication are a child's first step toward becoming an active talker, and differences in children's ability to segment conversational speech signals are predictors of later language development (Newman, Ratner, Jusczyk, Jusczyk, & Dow, 2006). As children develop, language comprehension becomes increasingly important. For instance, in a study conducted by Flax, Realpe-Bonilla, Roesler, Choudhury, and Benasich (2009), children's language comprehension at three years of age predicted various language and reading measures at seven years of age. Furthermore, children with stronger early linguistic skills tend to outperform children with weak early linguistic skills on assessments of literacy abilities in school, and this gap appears to widen over time (Bast & Reitsma, 1998; Torppa, Poikkeus, Laakso, Eklund, & Lyytinen, 2006). Parents who support

their children's language and later emergent literacy learning intensively by providing a high-quality HLE facilitate children's vocabulary acquisition (Mol, Bus, de Jong, & Smeets, 2008; Niklas & Schneider, 2015). Consequently, the HLE appears to play an important role in children's early linguistic development.

HLE and Reading to Children

Research demonstrates that home learning environments are associated with children's numeracy abilities (e.g., Kleemans, Peeters, Segers, & Verhoeven, 2012; Niklas & Schneider, 2014) and behavioral outcomes (e.g., Schmiedeler, Niklas, & Schneider, 2014), and predict children's literacy competencies (e.g., Niklas & Schneider, 2013; Sénéchal & LeFevre, 2002). For instance, Niklas and Schneider (2013) demonstrated that aspects of the HLE such as parental reading, reading to the child, and the number of books in a household predicted preschoolers' vocabulary and phonological awareness as well as the further development of literacy competencies even when controlling for a range of child and family background variables.

Sénéchal and LeFevre (2002, 2014) showed specific associations of different aspects of the HLE with children's linguistic and literacy competencies. The informal literacy environment consisted of variables measuring the shared reading behavior in the family, whereas the formal literacy environment took parents' literacy teaching into account. Parents' literacy teaching predicted letter knowledge and phonological awareness, whereas the informal literacy environment was associated with vocabulary growth.

Despite the fact that the HLE is a multifaceted construct, reading to children is still a fundamental element of this construct. Exposure to books supports vocabulary acquisition (Bus et al., 1995; Farrant & Zubrick, 2012; Prevoo et al., 2014) as books typically contain more complex vocabulary than common usage vocabulary (Sénéchal, LeFevre, Hudson, & Lawseon, 1996). Early meta-analyses conducted by Scarborough and Dobrich (1994) and Bus and colleagues (1995) revealed that reading to children explained about 8% of the variance in children's linguistic competencies. This finding is important as reading to children can be more easily manipulated than, for instance, family SES. In addition, one can assume that early effects of a positive learning environment are cumulative over time (Sénéchal & LeFevre, 2001; cf. Stanovich, 1986).

In addition to the frequency of reading and quality of reading (Lever & Sénéchal, 2011; L. M. Phillips, Norris, & Anderson, 2008; Sim & Berthelsen, 2014), the onset of reading seems to play an important role (DeBaryshe, 1993; Niklas, Cohrsen, Tayler, & Schneider, 2016; see also B. M. Phillips & Lonigan, 2009). In their study, B. M. Phillips and Lonigan (2009) analyzed the relationship of different measures of the HLE—among these the onset of reading to children—with various background characteristics of the family. Here, higher

quality HLE was associated with greater family income, better caregiver education, and lower educator stress level. However, no child outcome measures were included in the analyses, and the focus was not on the onset of reading to children.

In her study, DeBaryshe (1993) found that the age at which 41 two-year-old children were first read to was a better predictor of oral language skills than the frequency with which children were read to or visited the library. It should be noted that correlational data only were used and no control variables for family or child characteristics were included in this analysis. Given the small sample size, the young sample, and the fact that important family characteristics such as family language or migration background were not taken into account, the findings of DeBaryshe need to be regarded as preliminary—important as they are.

In a German study (Niklas, Cohrsen, Tayler, & Schneider, 2016), the age children were first read to was a significant predictor of reading frequency in kindergarten, children's rhyming abilities, vocabulary, and, to a lesser extent, other cognitive abilities such as numeracy skills and intelligence as well. However, the onset of shared reading was assessed according to categories only and about 75% of the sample fell into the earliest category (shared reading started before the child age of two years). In addition, although research indicates that the association of the HLE with children's linguistic and cognitive outcomes seems to be comparable across countries, there is also evidence that the HLE might be more closely associated with children's vocabulary in German-speaking contexts than in English-speaking contexts (Niklas, Tayler, & Schneider, 2015).

Although these studies indicate that starting shared reading early seems to be beneficial for children's linguistic development, little is known about whether the age at which parents first read to children is a specific predictor of English-speaking preschoolers' linguistic competencies, even when controlling for child and family characteristics. In addition, we do not know whether children start to benefit from parents reading to them from a particular age.

The Current Study

Research has shown that literacy-based parent-child interactions in general, and reading to children in particular, support the development of children's linguistic competencies (Bus et al., 1995; Liebeskind et al., 2014; Sénéchal, Pagan, Lever, & Ouellette, 2008). However, despite a few studies analyzing the onset of reading (e.g., DeBaryshe, 1993; Niklas, Cohrsen, Tayler, & Schneider, 2016), there are still questions to answer. This study uses data from an Australian study to analyze the association of the onset of parent-child reading with (a) the frequency with which children were read to in the year prior to commencing formal school education, and (b) various child outcomes.

We expected the age at which children were first read to would be closely related to the frequency with which children

were read to in the year before school as well as to children's linguistic abilities, and would predict these even when controlling for child and family characteristics. As shared reading seems to be a fairly specific predictor for children's linguistic competencies, we expected weaker associations with other cognitive child abilities such as concentration, numeracy competencies, and intelligence. We also anticipated that the onset of shared reading would not predict these abilities significantly when controlling for child and family characteristics. In an additional exploratory approach, we tested whether and how the associations between the onset of shared reading and the outcome variables changed for different subgroups of children by incrementally excluding children whose parents started reading to their children comparatively late.

Method

Participants

All 104 preschoolers attended one of four child care centers located across one local government area in Melbourne. After obtaining approval from local government, formal consent to conduct the study was obtained from the center coordinators, directors, and teachers. Each family registered as using the various early childhood settings was invited to participate in the study. Members of the research team were on hand to obtain consent from parents and caregivers and to answer questions at morning drop-off and afternoon pickup times.

Children were assessed toward the end of their final term in kindergarten. In the sample, boys (55.8%) outnumber girls (44.2%), with a mean age of approximately 5 years 2 months ($SD = 4.0$ months) at the time of assessment. About 6% of the sample spoke a language other than English as the main language at home. In 37% of the sample, at least one of the parents, or the child, was born outside Australia. However, when participants born in a country in which English is an official language were excluded from the migrant group, the overall percentage of children with a migration background decreased to 20.6%.

The assessment of children took place in the kindergarten rooms during November and December 2014, and thus about two months before the children entered school as the school year in Australia starts at the end of January. Multiple assessment tasks were used and those relevant to the analyses are briefly described below. In addition, parents were asked to complete surveys on family background characteristics and their reading behavior at three points during 2014.

Measures—Assessment of Children's Linguistic and Other Cognitive Competencies

Several subtests were drawn from the Woodcock-Johnson III Tests of Cognition and Achievement (WJ III; Mather & Woodcock 2001a, 2001b; McGrew, Woodcock, & Mather,

2001). The WJ III is a standardized, normed measure frequently used to assess children's achievement (e.g., Chien et al., 2010; Duncan et al., 2007).

Verbal Comprehension. This test has four subtests: Picture Vocabulary, Synonyms, Antonyms, and Verbal Analogies. Each subtest starts with a sample item to demonstrate how to approach the question and for the researcher to provide feedback to the child. Thereafter, no feedback is provided. Together, these subtests measure different aspects of children's acquired vocabulary skills. For four- to six-year-old children, estimated reliabilities on Verbal Comprehension range from .89 to .90.

Sound Awareness, subtest: Rhyming. Here, children had to provide a word that rhymed with a given word or sentence. This subtest becomes increasingly complex the further one advances through it. The median reliability for WJ III Sound Awareness is .81.

Concept Formation. This task requires rule application and frequent switching from one rule to another. It is a broad measure of the ability to reason, form concepts, and solve problems, using unfamiliar information or novel procedures. For each presented item, the child tries to figure out the rule that divides a set of symbols into two groups. Other than in similar assessment tools, during the assessment of concept formation, the child receives feedback on the performance, and in case of wrong answers the correct one is pointed out and explained (*median test reliability* = .94).

In addition to the WJ III subtest, two other assessments were used to measure children's short-term concentration and their numeracy abilities.

Concentration. The Frankfurt Tests for Five-Year-Olds–Concentration (FTF-K; cf. Esser, 2002) measures children's ability to work quickly, to remain goal-oriented, and to concentrate. In this timed, paper-and-pencil worksheet test, children are required to draw a line through as many pears as possible in 90 seconds while disregarding the apples. Pears and apples are black line drawings presented in rows and filling one side of an A4 page (retest reliability for up to 3 weeks: $r_{tt} = .79-.85$).

Numeracy abilities. Four subtests were used to assess children's numeracy abilities: Counting, Identifying Number Symbols, Stating Number Values, and Estimating Amounts. In the Counting subtest, children were asked to count forward and backward and to name numbers that immediately precede or follow a spoken number word. They were also shown number symbols from 1 to 21 in a nonnumerical sequence and asked to name the number. The number values task required children to match cards depicting different numbers of stick-figure drawings of children with a spoken quantity or with an indicated numeral on a number line from 1 to 10. Finally, children were

presented with a subitizing task. Dotted cards were revealed for 3 s and the children were first required to state how many dots had been seen and then to compare the number of dots presented. The sum scores of each of the four subtests were combined in a total sum score that measured children's early numeracy ability (Cronbach's $\alpha = .70$).

Measures—Parent Survey

Parents were requested to complete surveys about child and family characteristics and the HLE, and 98 surveys were returned. In addition to providing information on migration background and main language spoken at home (see sample description), respondents were asked about their occupation and their partner's occupation to assign prestige values to these occupations (cf. Wegener, 1988). Here, values from 20 (an unskilled laborer) to 186.8 (a physician) are assigned. The household occupation awarded the highest prestige was used as an indicator of family SES ($M = 99.7$, $SD = 33.5$).

Parents were asked whether they read to their child, independent of the language used, and how old the child was when first read to (parents were required to enter years and months in the space provided). Only one family reported not having read to their child. More than one third of the sample (37.5%) indicated that they started reading to their child within the first three months after the child's birth and four families reported that they read to their child from birth. This early start was sometimes attributed to the participating child having older siblings whom they joined for reading sessions. Another third of the families started reading to their child when they were four to six months old. Six months was the mode (24%) and 6.34 months the mean ($SD = 5.90$) for this sample. These findings align very well with the reported average onset of reading in a study by B. M. Phillips and Lonigan (2009). Almost all families had started reading to their children by the time the children were 15 months old (93.8%). Two parents reported starting to read to their children when they were 18 months old, three parents first read to their children when they were two years old, and one family started reading to their child when he was three years old (see Figure 1).

Finally, on three occasions during 2014, parents were asked to report the number of days during the preceding week on which the study child had been read to. The average of these three values (Cronbach's $\alpha = .89$; $r_{tt} = .65-.80$) was used to indicate the average number of days a child was read to in a typical week during the year prior to commencing school. Almost half of the families reported having read to their child every day (49%). Another 25% of the respondents read to their children on five or six days per week, and 11.2% read to their child on three days or fewer.

Analytic Approach

First, correlations and descriptive statistics for all study variables are reported. Pearson's r was used as correlation

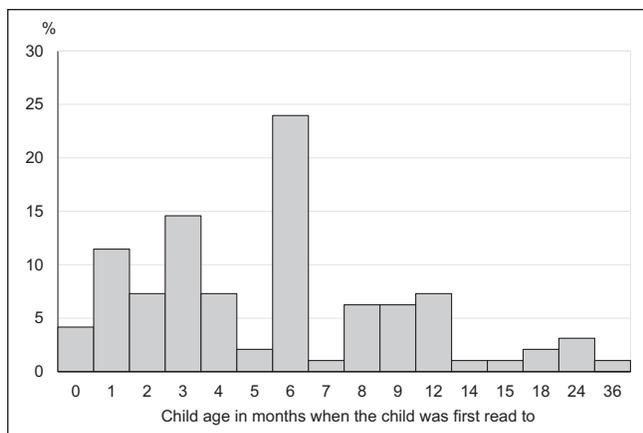


Figure 1. Distribution of child age in months when the child was first read to.

coefficient for all correlations except for the correlations of onset age of shared reading with the other variables as this variable was slightly positively skewed (skewness = 2.3). Here, Spearman's rho was used instead. Thereafter, correlations (Spearman's ρ) of first reading to a child with the other variables are reported for reduced samples, excluding families that report late onset of first parent-child reading. Here, we started with the full sample of children with available data (child age when the child was first read to ≤ 36 months) and reduced the sample to children aged 12, 9, 6, or 3 months and less when read to for the first time. This exploratory approach tested whether the associations of the study variables change for these subsamples. Finally, regression analyses were conducted to predict both current reading frequency and children's linguistic, and other cognitive competencies by the age the child was first read to, while controlling for child age, sex, and main language as well as family SES and migration background. Here, in a first model, the control variables are used as predictors, and in a second model, first parent-child reading is introduced into the model as additional predictor.

Results

Table 1 presents the correlations and descriptive statistics for all study variables. The later that parents started reading to their child, the less frequently they read to their child in the year prior to school. No significant associations of first reading with child sex, age, and main language and with concentration and numeracy abilities were found. However, children who were read to earlier showed greater rhyming ability, verbal comprehension, and concept formation. In addition, first reading was significantly associated with family background variables. Here, families with a migration background or with a lower SES began reading to their children later. Children in these families also showed significantly lower verbal comprehension. As expected, all linguistic and

cognitive abilities were highly correlated. Current shared reading frequency showed similar associations with the study variables as onset of shared reading with the exception that the frequency children were read to was significantly associated with children's numeracy abilities.

In a next step, correlations were again calculated, this time for subsamples excluding families who started reading to their children late. As can be seen in Table 2, excluding families from the analysis who started reading to their children after their child's first birthday, or after the child was 9 months old, did not change the picture much although first reading was no longer significantly associated with family background variables. However, including only those families who started reading to their children when the child was 6 months old or younger led to small, nonsignificant correlations of first reading with the frequency with which the child was read to in the final year of preschool and with children's verbal comprehension. Rhyming and concept formation were still significantly associated with the onset of reading in that children who were read to earlier within this subsample still showed greater performance on these assessment tasks. Finally, when we included only those families who started reading to their child when the child was three months old or younger, no significant correlations were found at all. In addition, most correlations were close to 0.

In a last step, regression analyses were used to predict reading frequency in the final preschool year, and children's linguistic and cognitive abilities by first reading, when controlling for child and family characteristics (see Table 3). Even after controlling for various child and family characteristics, the age at which a child was first read to was a very strong predictor of parent-child reading frequency in the year prior to school (large effect size) and a significant predictor of children's rhyming abilities and verbal comprehension (small to medium effect size). In comparison, first reading was not a significant predictor of children's concentration and numerical abilities ($p > .60$) and only a marginally significant predictor of children's concept formation ($p < .10$; 3% of additional explained variance by age the child was first read to; small effect).

In addition, older children showed greater competencies but were not read to more frequently, and there was a tendency that children who spoke English as their main language and came from higher SES families performed better in the linguistic tasks. Finally, boys were read to more frequently in our sample, and girls performed better on the rhyming task and slightly better on concept formation and concentration.

Discussion

Early support of children's linguistic competencies is essential as linguistic and literacy skills play a major role in everyday life and are important for later academic achievement and life success in general (Fawcett, 2003; Lyon, 2002).

Table 1. Correlational Analyses and Descriptive Statistics (Means and Standard Deviations) for all Study Variables.

	2	3	4	5	6	7	8	9	10	11	12	M	SD
First read to (child age in months)	-.41**	.10	.06	.25*	-.16	-.29**	-.36**	-.33**	-.38**	-.15	-.13	6.34	5.90
Reading frequency (2)		.12	.00	-.05	.21*	.28**	.26*	.35**	.21*	.12	.23*	5.74	1.59
Sex (0 = female; 1 = male) (3)			.26**	.14	-.14	-.12	-.23*	-.13	-.20*	-.16	-.07	0.56	0.50
Age in months (4)				-.01	.08	-.22*	.12	.16	.14	.18	.28**	52.74	3.96
Migration background ^a (5)					-.25*	-.06	-.15	-.24*	-.23*	-.13	-.09	0.37	0.49
Main language ^b (6)						.06	.18	.33**	.12	.11	.11	0.94	0.24
SES (7)							.29**	.26*	.19	.03	.11	99.71	33.53
Rhyming (8)								.63**	.34**	.36**	.39**	6.55	4.17
Verbal comprehension (9)									.51**	.40**	.49**	22.09	5.64
Concept formation (10)										.31**	.43**	9.93	6.36
Concentration (11)											.43**	28.41	5.87
Numeracy abilities (12)												21.45	5.97

Note. SES = socioeconomic status.

^a0 = no migration background; 1 = one or both parents and/or child born abroad.

^b0 = another language than English is child's main language; 1 = English is main language.

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

Table 2. Correlational Analyses (Spearman's ρ) for Age, the Child Was First Read to in Months, With the Study Variables for Different Subgroups of Children.

First reading (child age in months)	<i>n</i>	Reading frequency	Sex ^a	Age in months	Migration background ^b	Main language ^c	SES	Rhyming	Verbal comprehension	Concept formation	Concentration	Numeracy abilities
Age												
≤36	96	-.41**	.10	.06	.25*	-.16	-.29**	-.36**	-.33**	-.38**	-.15	-.13
≤12	88	-.30**	-.03	.01	.25*	-.04	-.14	-.29**	-.25*	-.35**	-.07	-.08
≤9	81	-.22*	.00	-.09	.17	-.07	-.03	-.31**	-.25*	-.39**	-.11	-.18
≤6	68	-.04	.06	-.02	.12	-.04	-.04	-.32**	-.17	-.31*	-.13	-.14
≤3	36	-.06	.14	.19	.07	-.02	.28	-.07	.05	-.24	.08	.24

Note. SES = socioeconomic status.

^a0 = female; 1 = male.

^b0 = no migration background; 1 = one or both parents and/or child born abroad.

^c0 = another language than English is child's main language; 1 = English is main language.

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

Results in this study demonstrate that early onset of parent-child reading is favorable for children's linguistic competencies (cf. DeBaryshe, 1993; Niklas, Cohrssen, Tayler, & Schneider, 2016). Whereas onset of shared reading explained a similar amount of variance in both, children's rhyming abilities and verbal comprehension, research indicates that the onset of shared reading should be a better predictor of children's linguistic abilities such as vocabulary, as opposed to literacy competencies such as sound awareness (Niklas, Cohrssen, Tayler, & Schneider, 2016; Sénéchal & LeFevre, 2002, 2014).

Furthermore, the age at which children were first read to was highly correlated with the frequency with which they were read to in the year before school. This finding indicates that the early parent-child reading onset may be regarded as a marker for general literacy habits in a family. Clearly, the age at which children were first read to represents an important aspect of the HLE (cf. Niklas, Cohrssen, Tayler, & Schneider, 2016; B. M. Phillips & Lonigan, 2009).

In a set of additional regression analyses, we included the current frequency with which the child was read to as an additional predictor of child outcomes. This led to the onset of shared reading becoming a nonsignificant predictor of children's linguistic competencies. Whereas children's vocabulary was predicted by current frequency of shared reading, no significant amount of variance of rhyming was explained any longer by these two variables. These findings may be partly due to multicollinearity for which we found evidence. However, they also indicate that current reading behavior seems to be a better predictor of child outcomes than the onset of shared reading, while the onset of shared reading may be more of an indicator of the later HLE. Small sample size may partly explain the reduced and nonsignificant amount of explained variance in child linguistic competencies by onset of shared reading, given that in a larger German study, onset of shared reading remained a significant predictor of child vocabulary and rhyming abilities when current frequency of shared reading was controlled (cf. Niklas, Cohrssen, Tayler,

Table 3. Regression Analyses to Predict Frequency, Children Were Read to in the Last Year Before Formal Schooling, Children's Rhyming Abilities, Verbal Comprehension, Concept Formation, Concentration, and Numeracy Abilities.

Variable	Unstandardized regression coefficient B	SE	t value	Explained variance R ²	Gain ΔR ² by first reading ^a
Reading frequency					
Model 2				.32**	.17**
Age	-0.00	0.04	-0.03		
Sex (0 = female; 1 = male)	0.72	0.30	2.39*		
Migration background ^b	0.18	0.30	0.59		
Main language ^c	0.66	0.63	1.05		
SES	0.01	0.01	1.21		
First reading ^a	-0.13	0.03	-4.62**		
Rhyming					
Model 2				.24**	.04*
Age	0.24	0.11	2.31*		
Sex (0 = female; 1 = male)	-1.71	0.83	-2.05*		
Migration background ^b	-0.42	0.84	-0.50		
Main language ^c	0.71	1.76	0.40		
SES	0.03	0.01	2.10*		
First reading ^a	-0.17	0.08	-2.15*		
Verbal comprehension					
Model 2				.28**	.04*
Age	0.32	0.14	2.33*		
Sex (0 = female; 1 = male)	-0.93	1.10	-0.85		
Migration background ^b	-1.47	1.11	-0.13		
Main language ^c	4.57	2.31	1.97 [†]		
SES	0.03	0.02	1.92 [†]		
First reading ^a	-0.21	0.10	-2.04*		
Concept formation					
Model 2				.18*	.03
Age	0.37	0.17	2.21*		
Sex (0 = female; 1 = male)	-2.36	1.32	-1.79 [†]		
Migration background ^b	-2.12	1.33	-1.59		
Main language ^c	-0.75	2.78	-0.27		
SES	0.03	0.02	1.23		
First reading ^a	-0.21	0.12	-1.70 [†]		
Concentration					
Model 2				.09	.00
Age	0.35	0.16	2.15*		
Sex (0 = female; 1 = male)	-2.25	1.28	-1.76 [†]		
Migration background ^b	-1.00	1.29	-0.77		
Main language ^c	0.71	2.69	0.26		
SES	0.00	0.02	0.21		
First reading ^a	-0.06	0.12	-0.49		
Numeracy abilities					
Model 2				.13*	.00
Age	0.51	0.16	3.20*		
Sex (0 = female; 1 = male)	-1.46	1.27	-1.14		
Migration background ^b	-0.49	1.29	-0.38		
Main language ^c	0.85	2.68	0.32		
SES	0.03	0.02	1.29		
First reading ^a	-0.05	0.12	-0.40		

Note. SES = socioeconomic status.

^aFirst reading to child (child age in months).

^b0 = no migration background; 1 = one or both parents and/or child born abroad.

^c0 = another language than English is child's main language; 1 = English is main language.

[†]p < .10. *p < .05. **p < .01.

& Schneider, 2016). Finally, current reading frequency also significantly predicted children's numeracy abilities. This finding may be due to shared reading being associated with numeracy-related activities in the home which were not controlled (Niklas, 2015) or to the numeracy abilities assessed depending to some extent on children's verbal skills.

In exploratory analyses, the onset of shared reading proved to be closely associated with later reading frequency and with children's linguistic competencies, even when excluding those families from the sample who started reading to their children comparatively late. Consequently, the significant associations were not due to child and family characteristics in the few cases in which the child was first read to very late. The associations changed meaningfully only when all children were removed from the sample who were first read to at 6 months of age or later. This may be due in part to the somewhat diminished variance in onset of reading in the remaining subsamples. However, the variance in all other study variables remained stable for all analyzed subsamples, suggesting that the findings are not the result of lack of variance only. Consequently, parents should be encouraged to start reading to their young children early.

Although it is unlikely to make much difference whether parents start reading to children at the age of two or four months, our findings indicate that reading aloud to a child before the child reaches the age of six months appears to be advantageous to the child's linguistic development. Research shows that children are sensitive to language even prenatally (Moon et al., 2013; Partanen et al., 2013), yet in the first few months after a child is born, general language experiences are more likely to make a difference than reading aloud. However, as no negative effects of a very early start of reading to a child are to be expected, the sooner the better appears to be best.

Whereas some studies found comprehensive measures of the HLE to be a predictor of children's numeracy abilities as well (Anders et al., 2012), the onset of reading to a child proved to be a specific predictor of children's linguistic competencies, but not of numeracy competencies or of concentration. Obviously, shared book reading events present rich opportunities for children to acquire new vocabulary, to rehearse new words in extended conversations, to play with language, and to experience the purpose of print media. All of these experiences support children's linguistic development (Bus et al., 1995; Mol et al., 2008; Schatschneider et al., 2004; Torgesen, 2002; Torppa et al., 2007).

The age at which children were first read to was also related with children's concept formation in correlational analysis. Furthermore, first reading was a marginally significant predictor of concept formation, after controlling for child and family characteristics ($p < .10$, small effect size). This aligns with recent studies that reported small to medium effect size associations of the home learning environment with intelligence (Frumkin, 2013; Kleemans et al., 2012; Niklas, Cohrssen, & Tayler, 2016).

Also aligning with results from earlier research, both the onset of parent-child reading and reading frequency were closely associated with background variables such as family SES and migration background (Aikens & Barbarin, 2008; Edwards, 2014; Niklas et al., 2013; Prevoo et al., 2014). However, the association of the age at which children were first read to with children's linguistic outcomes remained significant when "late onset reading" children were excluded from the sample, whereas the association with family background variables diminished. In addition, first reading remained a significant predictor of children's linguistic outcomes when controlling for SES, migration background, and child's main language. The onset of shared reading is thus an important predictor of both later shared reading frequency and child linguistic competencies, independent of the family background.

Some further interesting results were observed. As expected in samples of children as young as these, child age was a significant predictor of all child outcomes. In addition, boys were read to more frequently, whereas girls showed somewhat greater cognitive abilities. We can only speculate on these findings. Given the small sample size, these results may be random. Alternatively, the parents of boys in our sample may have thought that their children would need greater support and thus read to them more frequently.

Limitations

The onset and frequency of parent-child reading were self-reported in parent surveys and such survey responses are susceptible to perceived social desirability. Prospective longitudinal studies would be needed for more accuracy as parents might also not remember correctly the age of their child when they first started reading to him or her. However, previous home learning environment studies have shown that surveys provide reliable data and lead to findings that are closely related to those obtained with other measures (cf. Burgess, 2002). Consequently, although our approach certainly has to be regarded as exploratory and preliminary, and the findings interpreted with caution, our correlational analyses with subsamples may help to better understand the association of onset of shared reading and various outcome variables, and may provide a first hint at the child age at which shared reading supports children's linguistic development.

Beyond the limitation of self-reported, retrospective estimations of the onset of shared reading by parents, other limitations mark this study. The sample size was small and characterized by, on average, middle to high SES families. One may expect to find later onsets of reading and less frequent reading to children in samples with a low to middle family SES (Niklas, Cohrssen, Tayler, & Schneider, 2016). Further research needs to test whether the associations found in this study would change with a wider range of family SES. Nonetheless, the onset of reading and the frequency with which children were read to align very well with figures

reported in other international studies (Duursma, 2014; B. M. Phillips & Lonigan, 2009).

In addition, it is not possible to interpret our results causally due to the high likelihood of gene–environment interactions, that is, inherent parent and child characteristics influencing both, the HLE and child outcomes. Future research should test whether onset age of shared reading varies between families with or without a genetic risk for dyslexia and analyze possible interactions.

We also did not assess whether children in families with a background of migration were read to in English or in a language other than English. As the child outcomes were all assessed in English, this might have played a role. However, in families with a migration background, children not only had more limited vocabularies, but onset of parent–child reading also occurred later, independent of the language used.

In our study, we focused only on the age at which children were first read to and the frequency with which they were read to in the final preschool year. Consequently, we do not consider other aspects of shared book reading that play a major role in children’s linguistic development such as the quality of the reading (e.g., Mol et al., 2008; L. M. Phillips et al., 2008) or the appropriateness of the book (Kucirkova, Messer, & Whitelock, 2012). Future studies need to explore the relationship between onset of shared book reading and the quality of the book reading.

Unfortunately, we were not able to include children’s actual reading or spelling abilities in school or literacy competencies in kindergarten as outcome measures to test whether the age children were first read to also predicts these outcomes. However, children’s rhyming abilities and vocabulary are important predictors of later reading and spelling abilities (e.g., Bowman et al., 2003; Schatschneider et al., 2004). Consequently, the onset of shared reading should also be associated with later academic achievement in school.

Conclusion

Despite these limitations, this is one of the first studies to focus first on the influence of the age at which children were first read to on the development of children’s linguistic skills, and second on how this first reading is associated with later literacy experiences in the home. The findings indicate that starting early can support the development of children’s language abilities and that the onset of shared reading seems to be a good and specific indicator of the overall HLE. Consequently, parents should be encouraged to start reading to their children when they are very young—the sooner, the better.

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